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An Experimental Examination of Visual Grouping Techniques in Skip Patterns on Respondent Navigation Errors

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by

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Researchers are able to obtain better coverage and response rates with mail surveys compared to landline telephone surveys due to (1) easier access to the United States Postal Service (USPS) Computerized Delivery Sequence File (CDSF) (Iannacchione, 2011), and (2) the rise of households with no landline telephone (Blumberg and Luke, 2016). However, the use of the mail mode raises important challenges, such as the need to help respondents navigate the questionnaire without interviewer assistance.

As not all questions asked are relevant to all respondents, skip patterns are introduced to navigate respondents around questions that do not apply to them. With no computers or interviewers to assist, respondents may commit one of three errors: omission errors (failure to answer follow-up questions when they should have answered them), commission errors (answer follow-up questions when they should have skipped them), or item nonresponse (failure to answer initial filter question).

The first published empirical piece on this topic reported results of an experiment for the 2000 US decennial census where adding verbal and visual cues significantly decreased skip errors (Redline et al., 2003). Since this research was conducted, there has been enormous growth within survey methodology in understanding how respondents process visual information. Survey methodologists have drawn on concepts from the visual sciences and cognitive psychology to better

understand how visual design can be used strategically in questionnaire design (Dillman et al., 2014; Tourangeau et al., 2004).

This dissertation research tests three visual design elements aimed at further decreasing skip errors in mail surveys—common region, indentation, and sub-numbering. Each design is intended to create stronger grouping and subgrouping among items within skip patterns, making navigation through them clearer and decreasing skip errors. The overall effectiveness of each element is assessed by examining rates of item nonresponse on the first question of the skip pattern, omission and commission errors. Error rates will also be examined for respondents of different age, education, literacy, and motivation levels.

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Chapter 1: Introduction

1.1 Motivation

The United States Postal Service (USPS) has made the Computerized Delivery Sequence File (CDSF)—a list of mailing addresses for U.S. households—available for use by researchers. Because the CDSF covers over 95% of U.S. households (Iannacchione, 2011), and, as of May 2016, 48.3% of households no longer have landline telephones (Blumberg and Luke, 2016), researchers are now able to obtain better coverage and response rates with mail surveys than with landline telephone surveys. Thus, many surveys are being switched to or started in mail. The use of the mail mode raises other important challenges, such as the need to assist respondents with navigating the questionnaire without interviewer assistance.

As not all questions asked are relevant to all respondents, skip patterns are introduced to get respondents around questions that do not apply to them. With no computers or interviewers to assist respondents in navigating the skip patterns correctly in a mail survey, respondents may commit one of three main types of errors. Respondents can either fail to answer the follow-up questions when they should have answered them (errors of omission) or answer the follow-up questions when they should have skipped them (errors of commission). In addition, some respondents may become too focused on following the skip instructions that they forget to register their response to the initial filter question (item nonresponse). All of these types of error result in higher rates of missing data because questions are either not answered or researchers cannot tell what respondents meant to answer and thus must code these questions as missing (Redline et al., 2003). In addition to losing important information, high missing data rates can undermine the statistical power needed for analyses, especially for subgroup analyses.

Certain subgroups may have more difficulty following the navigation of skip patterns than other subgroups, resulting in higher rates of missing data for these groups. Researchers have found that older and lower educated respondents have more difficulty undertaking complex survey tasks as they either do not have a large enough working memory capacity to hold all necessary information or they are unfamiliar or unable to navigate and complete a survey (Knauper, 1999; Knauper et al., 2007; Narayan and Krosnick, 1996; Krosnick et al., 1996). Skip patterns, which are a complex survey task, could result in large amounts of missing data for subgroups of older or lower educated respondents. Additionally, some respondents are less motivated (e.g., not interested in the topic of the survey) to fill out the questionnaire. These respondents are more likely to satisfice (Krosnick, 1991) resulting in poor quality data such as skip errors. Therefore, an important challenge of mail surveys is finding ways to design skip instructions to minimize respondent errors, both overall and for specific subgroups.

The first published empirical piece on this topic reported the results of an experiment for the 2000 US decennial census where the addition of verbal and visual cues significantly decreased skip errors (Redline et al., 2003). Since this research was conducted, there has been enormous growth within survey methodology in our understanding of how respondents process visual information. Specifically, survey methodologists have drawn on concepts from the visual sciences and cognitive psychology to better understand how visual design can be used strategically in questionnaire design (Dillman et al., 2014; Tourangeau et al., 2004).

This dissertation research will test three visual design elements aimed at further decreasing skip errors in mail surveys—common region, indentation, and sub-numbering. Each design is intended to create stronger grouping and subgrouping among items within skip patterns, making the navigational path

through them clearer and decreasing skip errors. The overall effectiveness of each design will be assessed by examining rates of errors of omission and commission, as well as item nonresponse on the first question of the skip pattern (i.e., the filter question). Error rates will also be examined for respondents of different age groups, education levels, literacy levels, and motivation levels.

1.2 **Background and Justification**

1.2.1 Communicative Principles

One goal of conversations is to exchange information so that all participants understand what is being said. Therefore, conversations typically consist of multiple statements that logically flow from one to the next, and participants in the conversation understand this flow. Therefore, it can be said that participants in a conversation follow specific conversational norms. Grice (1975) has defined four norms (maxims) in conversation:

1. Quantity: participants in a conversation should provide enough information so that their counterparts understand what is going on but not more than what is required.

2. Quality: participants in a conversation should be truthful.

3. Relation: statements in the conversation should be relevant to the conversation.

4. Manner: the conversation should be brief and orderly, avoiding obscurity and ambiguity.

Participants who follow these four maxims in conversations are said to be cooperative communicators. Schwarz (1996) argued that surveys are a type of conversation and that survey respondents act as cooperative communicators. This means that they follow these maxims when completing a questionnaire and they assume the researcher is doing the same. For example, respondents follow the maxims of quantity and relation by assuming that the researcher provides just enough information to answer the questions and all the information provided is relevant to the questions. Therefore, respondents will not just limit themselves to interpreting the text, but will also assume that the visual features of the questionnaire are related to the response task.

Researchers can use the fact that respondents are cooperative communicators to improve their design, by using visual features to provide instructions and help them answer the survey. For example, Smyth and colleagues (2009) found that respondents used the visual cue of the size of an open-ended text box to determine how much information to provide in their responses, giving longer more detailed answers when they received a larger answer box. Likewise, Christian and colleagues (2007) increased the percentage of respondents providing a date in the desired two-digit month and four-digit year format from 55% to 91% through a series of visual design manipulations. Specifically, they manipulated the size of the answer boxes and provided symbols (i.e., MM YYYY) instead of verbal labels (i.e., "month" and "year"). Both of these examples support the notion that respondents draw on visual as well as textual information when answering survey questions.

Other studies have examined the effects of visual design in areas of survey research such as visual context effects (Couper et al., 2004, 2007; Toepoel and Couper, 2011), grid questions (Chesnut, 2008; Kaczmirek, 2011; Couper et al., 2013), and scalar questions (Couper et al., 2006; Tourangeau et al., 2004, 2007;

Christian et al., 2009). In order to effectively use visual design features to assist respondents, researchers need to understand what respondents see in a survey and when they see it. Survey researchers have turned to the vision sciences to better understand visual processing.

1.2.2 Visual Processing Principles: What Respondents See and When

Ware (2012) states there are four stages of visual processing viewers go through as they observe a visual scene and attempt to recognize patterns within it. As viewers proceed through these stages, they move from pre-attentive processing, where they are subconsciously processing visual information, to attentive processing, where they are consciously processing the information. They also move from global processing of the entire visual scene to more focused and in-depth processing of individual elements within that scene.

The first three visual processing stages are part of pre-attentive processing where viewers are subconsciously processing the visual information. Stage one is called rapid parallel processing where viewers get a basic understanding of what they see (i.e., the overall global layout of a page in a mail survey). This includes identifying the size, color, contrast and shape of elements on the page as well as determining figure from ground. Viewers use a method of perception called bottom-up processing where they rely only on the sensory system (in this case, sight) and do not apply any prior information, context, or cultural meaning to take in and understand these elements (Jenkins and Dillman, 1997). In a self-administered survey, respondents (viewers) are able to discern the major characteristics of the elements on the page and determine which elements are part of the figure (e.g., the survey questions or instructions). This information is then used in later stages of visual processing as respondents know to focus on the figure

elements while letting the rest fade into the background.

The second stage of visual processing is pattern perception where viewers divide the elements seen during rapid parallel processing (the first stage) into regions and apply top-down processing. In contrast to bottom-up processing, during top-down processing viewers use additional information to make sense of the elements. Specifically, they may draw on multiple elements on the page as well as their own expectations based on previous knowledge and experiences to understand the elements they are looking at. Viewers can also use their expectations to try to recognize groupings or patterns among these elements (Jenkins and Dillman, 1997). These patterns generally follow one or more of the Gestalt laws of pattern perception. For example, elements that are close to each other follow the law of proximity and are perceived to be of the same group and different from elements that are not close (Ware, 2012). Other examples of the laws of pattern perception are elements that have common attributes (law of similarity), or are in the same enclosed space (law of common region).

The third stage of visual processing is when viewers hold the elements in their visual working memory. Viewers do not hold all elements at once but rather groups of elements and the rules defining those groups (laws of pattern perception) identified during pattern perception (the second stage). This way, when viewers do analyze individual items (in the fourth stage) they can easily recall the groupings and the defining rules.

During the fourth and final stage, viewers switch from pre-attentive processing (i.e., processing elements on a more sub-conscious level) to attentive processing, where they consciously process specific features on the page. Vision is greatly narrowed at this point, as viewers consciously focus on and analyze individual features in the visual field. As viewers read and look across the page,

they are limited to sharply seeing only the elements that are inside their foveal view, which is the space of about a 2-degree visual angle or the width of about 9 characters (Jenkins and Dillman, 1997; Ware, 2012). Elements outside the foveal view are not in sharp focus for viewers and are less likely to be noticed.

1.2.3 Visual Design Principles: Rules for Questionnaire Design

Survey researchers can leverage the fact that respondents process different types of visual information at different times to help respondents navigate a questionnaire. Using visual processing theory, Jenkins and Dillman (1997) developed two principles for helping respondents navigate questionnaires: (1) use multiple types of visual elements, and (2) use prominent visual guides to direct respondents. By using multiple types of visual elements, researchers can ensure that respondents see the elements at multiple stages of visual processing. For example, survey designers can use different shapes or colors that will be noticed and processed during pre-attentive processing in combination with text or numbers that will be noticed and processed during attentive processing. Christian and Dillman (2004) group these elements into four main types of visual languages: graphical, symbolic, verbal and numerical.

Within the survey context, graphical language refers to the appearance of the questions on the paper (e.g., spacing of questions and response options, use of images, or font size). Symbolic language refers to the use of symbols throughout the questionnaire (e.g., arrows). Verbal language is the actual words of the questions or instructions. Numerical language refers to numbers on the page such as the numbering of questions or response options. Graphical and symbolic languages tend to be identified and processed early, during pre-attentive processing, while verbal and numerical languages are typically processed during the later

attentive processing stage (Ware, 2012). These language types can be used in conjunction to support one another throughout the processing stages as suggested by Jenkins and Dillman's first principle. Additionally, graphical and symbolic languages provide a visual design aspect which can further assist respondents as suggested by Jenkins and Dillman's second principle. For example, the researcher can use two different languages, such as graphical and verbal, to communicate the skip instructions at multiple stages of the visual process and utilize visual design features. This then provides a strong visual stimulus and reiterates the importance of the skip pattern to respondents. However, it is important not to use too many elements as multiple visual elements can clutter the page and cause confusion (Ware, 2012), which in the survey context may increase the probability respondents will make a mistake.

One can also incorporate usability ideas from Norman (2002) to help researchers design usable skip patterns. Norman described seven principles for making difficult tasks easy. He stated that tasks should (1) use common knowledge, (2) have simplified structure, (3) be visible, (4) have correct relationships, (5) use constraints efficiently, (6) prepare for errors, and (7) be standardized. Dillman and colleagues (2005) argue that these seven principles for usability of products apply to surveys as well, and provide examples of how researchers can use these principles in many different aspects of survey design. Using the examples put forth by Dillman and colleagues (2005), I developed a set of six rules that can be applied to the specific problem of designing usable skip instructions that will minimize errors:

1. Have correct relationships (Principle 4). To avoid unwanted errors, the skip instructions should be accurate and account for all possible paths. Each response option should have an associated path, and any follow-up questions

should logically flow from the selected response option.

2. Have simplified structure (Principle 2) and use constraints efficiently (Principle 5). I combine principles 2 and 5 from Norman (2002) to create one rule for skip patterns. When designing skip patterns, researchers should limit the number of possible paths. Respondents should not be required to determine which path out of five is correct, for example, but rather only have two or three path options to navigate.

3. Be visible (Principle 3). Skip instructions should be visible to respondents when they need to use them. This means respondents should see the skip instructions right after the filter question or next to the response options of the filter question so they know where to go next.

4. Use common knowledge (Principle 1). The skip instruction should use common and cultural knowledge. All elements used should have some prior meaning to respondents such as numbers or arrows.

5. Prepare for errors (Principle 6). Skip instructions should help respondents prevent or detect errors. Each element of the instruction should be there to guide respondents through the navigation of the skip pattern and help them correct any mistakes they may have made.

6. Standardize (Principle 7). Skip instructions should be consistent throughout the survey. This means that respondents can learn how to navigate during the first skip pattern and recognize the cues in subsequent skip patterns, thus reducing burden on the respondent.

1.2.4 Previous Research on Skip Patterns: Application of Visual Design Rules

There is supporting evidence for these principles and ideas in the limited research on skip instructions in mail surveys. For example, Christian and Dillman (2004), using only one element of the framework (Rule 3, making the instruction visible) and one type of language (verbal language), found that placing the skip instruction before rather than after the response options for a question increased the percentage of respondents who correctly navigated the skip pattern. However, their skip pattern was very simple.[1]

When more complex skip patterns are present in a survey, other design elements need to be considered. Redline and colleagues (2003) tested five skip instruction designs using multiple elements to determine which method reduced errors:

1. "Skip to" Instruction—a small arrow (→) and "Skip to 31" placed after the response option
2. "Go to" Instruction—a small arrow (→) and "Go to 31" placed after the response option
3. Reverse Print Instruction—a small arrow (→) and "Go to 31" placed after the response option in white print on a black background
4. Prevention Instruction—a note to check for a "Go to" instruction placed before the question and a bolded "Go to" instruction placed after the response option

[1]In this example the authors did not have a filter question, but instead were using the skip instruction to tell respondents they did not need to answer the question if it did not apply to them (Christian and Dillman, 2004). See Appendix A for the question and visual design used in this experiment.

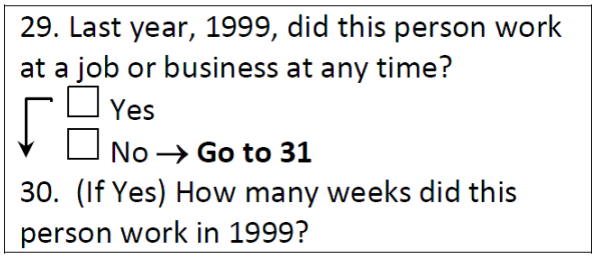

Figure 1.1: Example of detection method as used in Redline et al. (2003)

5. Detection Instruction—a bolded "Go to" instruction placed after the response option, an arrow leading from the response option to the next question, and wording in the next question reminding respondents to only answer that question if they selected "yes" (see Figure 1.1).[2]

After testing these five methods, Redline and colleagues found that the detection instruction method provided the lowest percent of respondents making omission (4.0%) and commission (13.5%) errors compared to the other methods (largest omission error was 7.6% with the reverse print instruction, and largest commission error was 20.8% with the go to instruction).[3]

The detection method uses many of the elements discussed in the framework for good navigation, such as prominent visual elements like bolded instructions (Rule 3), using common knowledge such as arrows to connect one question to the

[2]The instruction wording was only bolded in the Prevention and Detection Instructions and not in the "Skip to", "Go to" or Reverse Print Instructions. See Appendix A for examples of all five methods used in this study (Redline et al., 2003).

[3]The "Skip to" instruction method had 19.7% commission and 5.0% omission errors. The "Go to" instruction method had 20.8% and 5.4% commission and omission errors respectively. The reverse print instruction method had commission errors of 17.9% and omission errors of 7.6%. Finally, the prevention method had 14.7% commission and 7.0% omission errors. The "Skip to" and "Go to" instruction methods did not significantly differ for either the percent of commission or omission errors. All four methods significantly differed from the detection method for omission errors, and all but the prevention method differed from the detection method for commission errors (Redline et al., 2003).

next (Rule 4), and helping respondents detect errors by providing "(If Yes)" at the beginning of the first follow-up question (Rule 5). Additionally, the detection method incorporates verbal language (i.e., "Go to 31") to tell respondents where to go alongside the symbolic language of arrows. Even though this method reduced omission and commission errors, the percent of respondents making errors was still high (17.5% total).

Gohring and Smyth (2013) expanded on this research by changing three elements of the detection design from Redline and Colleagues (2003). First, they flipped the response options in the filter question, so that the response options that lead to skipping questions are on top and those that lead into the follow-up questions are on the bottom, more proximate to the follow-up questions. Second, they indented the follow-up questions using the Gestalt law of proximity to create a distinct visual grouping for the follow-up questions. Third, they changed the arrow leading from the response options into the follow-up questions from the left side of the response options to the right (see Figure 1.2) so respondents would read the response options and flow directly into the arrow, which is then consistent with the conventional reading direction. They found that this design decreased the commission errors for two of the six skip patterns they tested, but increased the omission errors for one of them. However, because they made three design changes at once, it is impossible to tell which (if any) of the features were the most effective, and which (if any) were not at all effective. More research is needed to fully understand the effects of these features.

1.2.5 Improving the Visual Design of Skip Patterns

There are two components to every skip pattern: the filter question and the follow-up questions. The previous research and experiments on skip patterns focus

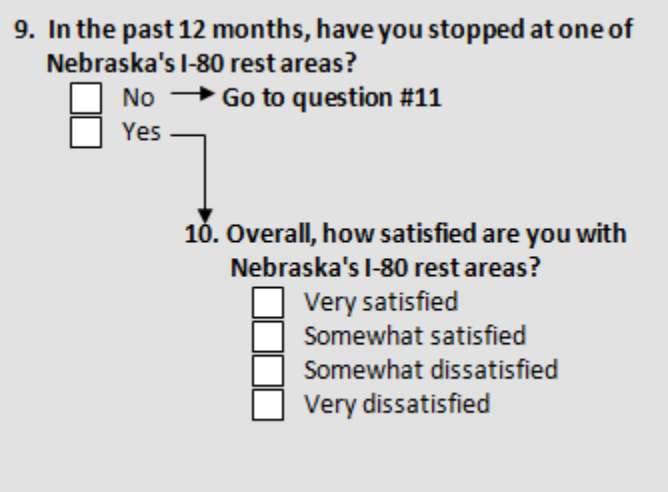

Figure 1.2: Example of a skip pattern from Gohring and Smyth (2013)

primarily on the design of the filter question and the elements of the corresponding skip instructions but not on the design of the follow-up questions. Incorporating design elements into both the filter and follow-up questions—in an effort to emphasize the relationship between these components—can help respondents differentiate between the follow-up questions and the questions everyone answers. One way to help respondents see this relationship is by creating visual subgroups that distinguish the two components. This dissertation will determine the effectiveness of these visual grouping features by examining skip errors.

Researchers can use the Gestalt laws of pattern perception to understand how respondents recognize visual patterns and thus how information can be displayed to create perceived groupings that might assist respondents. The Gestalt laws state there are many ways to establish visual groupings such as through proximity, similarity, common fate, common region, continuity, or elemental connectedness (Ware, 2012). This dissertation focuses on the principles of common region (enclosure), proximity, and similarity, and compares skip instructions designed using these grouping principles to the detection method from Redline and

colleagues (2003) which was the most effective design for both omission and commission errors in their research (See Figure 1.3, Form 1).

Common region (called enclosure in this dissertation) in skip patterns means that the follow-up items are located in a separate background area from the rest of the questions (see Figure 1.3, Form 2). This separate enclosure space should create the perception of two separate groups of items. Proximity in skip patterns will refer to the horizontal location of the question on the page. This means that the follow-up questions will be indented while questions that everyone answers are left aligned. The example of indentation in Figure 1.3, Form 3 shows that questions 23 and 24 are perceived to belong together and separate from question 22, thus creating two distinct groups. For this dissertation, similarity will refer to the similarity of the numbering. For example, Figure 1.3, Form 4 shows different numbering styles for follow-up questions compared to the other questions. This indicates that the questions with similar styles of numbering (i.e., the sub-numbering of 17a and 17b) are related to each other and are different from questions with a different numbering style (i.e., question 17a is different from question l7). Combinations of these grouping principles are also possible and shown in forms 5, 6, 7, and 8 Figure 1.4.

In all cases, visual design features are used to create stronger sub-grouping within the skip pattern in an attempt to help respondents understand that the follow-up questions belong to a separate group from the filter question and should only be answered if respondents meet certain criteria. In addition, these treatments rely on the different visual languages identified by Christian and Dillman (2004). Both separate enclosure and indentation rely on graphical languages. Separate enclosure creates a new background shape for the follow-up questions, while indentation moves the follow-up questions to a new location. Shape and location

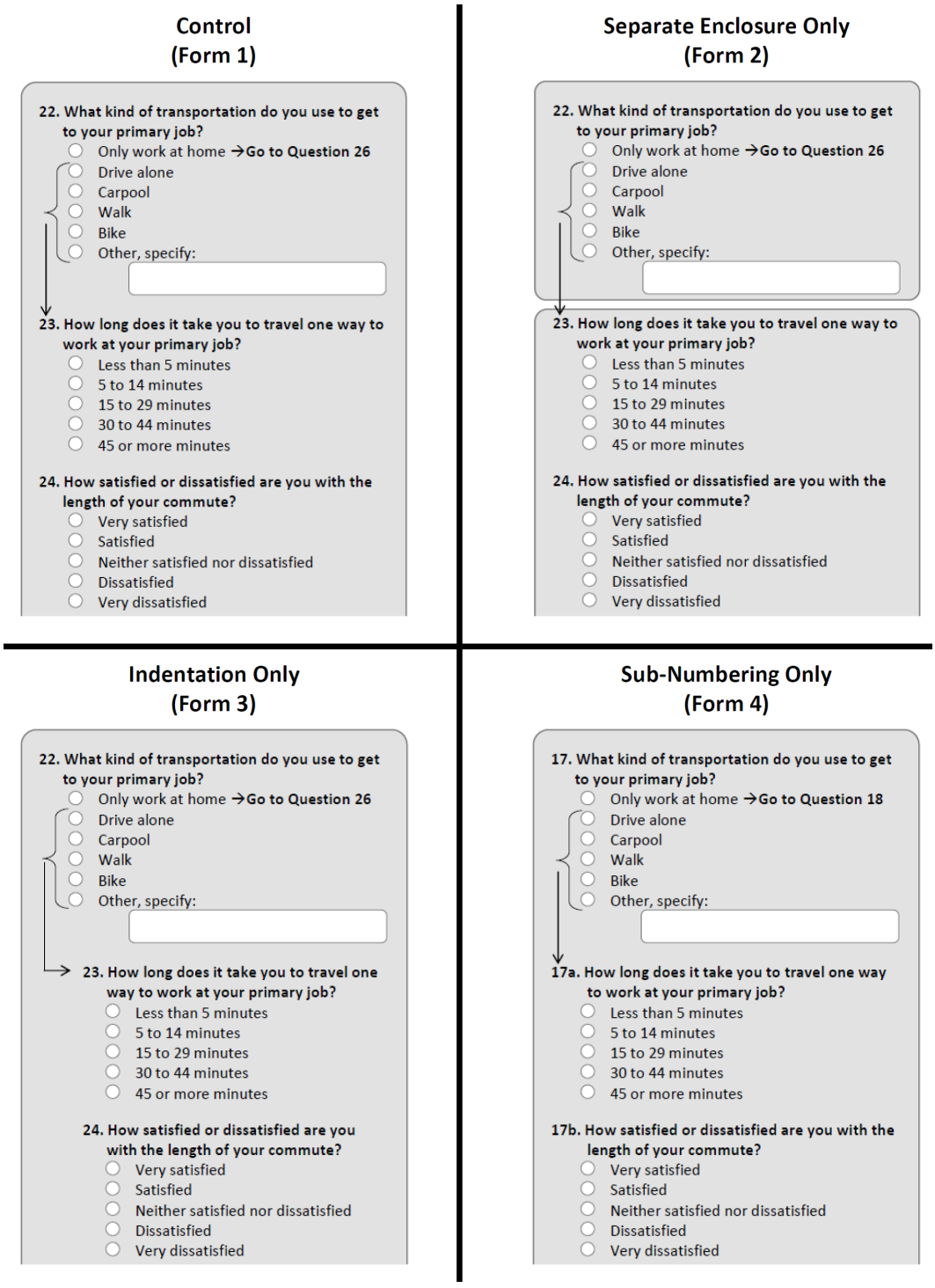

Figure 1.3: Example of skip pattern with single grouping elements for the labor survey

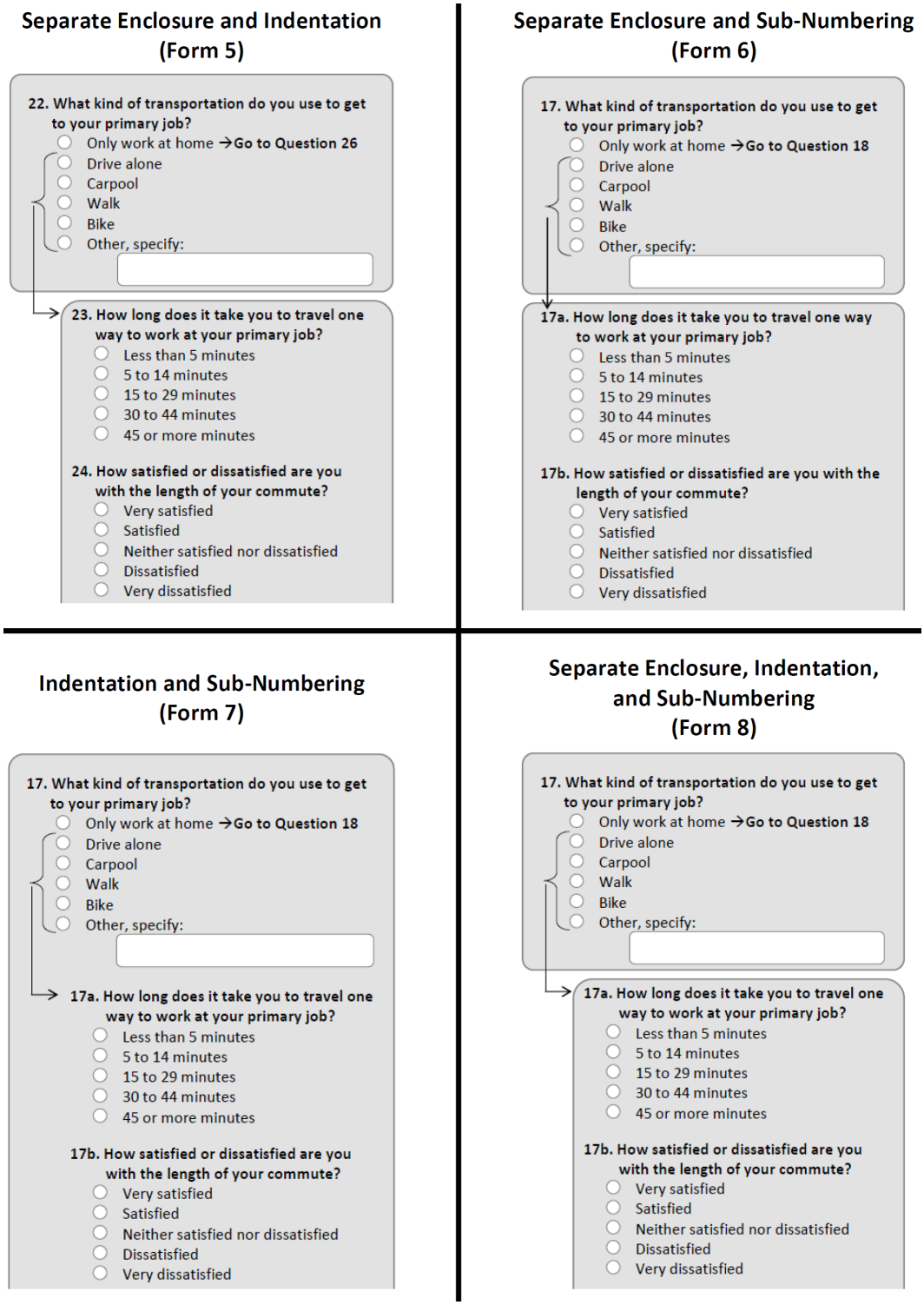

Figure 1.4: Example of skip pattern with single grouping elements for the labor survey

are features of graphical language which help respondents perceive differences between the follow-up questions and all other questions early in pre-attentive processing. Sub-numbering, on the other hand, relies on numerical language and attentive processing. The question numbers change from being numbers only to having a combination of numbers and letters. This combination helps respondents perceive differences between the follow-up questions and all other questions.

This dissertation examines the differences in these experimental treatments both overall and for specific subgroups of respondents. In particular, this research focuses on respondents with different cognitive abilities and different motivation levels.

1.2.6 Respondent Cognitive Ability in Survey Research

Research has shown that respondents with lower cognitive abilities have more difficulty completing complex survey tasks than respondents with higher cognitive abilities (Knauper, 1999; Narayan and Krosnick, 1996; Al-Tayyib et al., 2002; Smyth et al., 2011). Although cognitive ability cannot be measured directly, researchers have used age, education, and literacy as proxies for cognitive ability (Knauper, 1999; Narayan and Krosnick, 1996; Olson et al., 2011). Specifically, they argue that older respondents, respondents with lower education levels, and lower literacy respondents may have difficulty navigating skip patterns especially when there are written navigation instructions. Therefore, visual design elements alongside verbal language could lower survey errors for respondents who have difficulty understanding the written survey instructions alone.

This idea coincides with theories from cognitive psychologists, who believe that an individual's intelligence is not defined solely by their literacy and ability to think analytically, but rather defined as a combination of multiple types of

intelligence (Gardner, 1983; Sternberg, 1985; Carroll, 1993). Although each theory of intelligence is a bit different, they all incorporate a spatial component as well as a more traditional linguistic component. In a study of college students, Mayer and Massa (2003) found that spatial ability is uncorrelated with scores on SAT and vocabulary tests. The findings from this study support the multiple intelligence theories that linguistic ability and spatial ability are two distinct areas of cognitive ability and individuals do not need to rely on literacy or other intelligences to follow spatial cues. Therefore, appealing to respondents' spatial abilities by providing visual cues could be used in surveys to assist respondents who may not have strong linguistic abilities. Additionally, this indicates that the measures of age, education, and literacy are proxies of linguistic ability and not cognitive ability as a whole.

The limited research in the survey field shows that using spatial cues such as visual design elements can help respondents with lower linguistic abilities achieve better quality data. Specifically, Stern and colleagues (2007) tested a variety of visual design features commonly used in surveys and found that some demographic groups responded to the visual design features different than others. For example, respondents in all demographic groups entered more words when presented with a large answer space for open-ended questions compared to a small answer space. However, the difference in the mean number of words was greater (5.39 words on average) for respondents with less than a college degree compared to respondents with higher education (0.29 words on average). They also found other visual design features that had the same effect for all demographic groups, such as there were no differences across age or education levels in the probability of selecting items in a forced-choice compared to check all that apply formatted question. They argue that more research is needed to understand these effects because while the effects are in

the same direction for many demographic groups, the magnitude of the effect differs across the groups.

In skip patterns, Gohring and Smyth (2013) found no differences across demographic groups. However, they introduced three design changes without testing each individually. It is impossible to tell if the lack of significant differences across demographic groups was due to no effect from all three visual design elements, due to one visual element (for example, indentation) dominating, or due to a combination of positive and negative effects. For example, flipping the response options could have a negative impact for respondents with low cognitive ability (i.e., increase skip errors), while indentation of the follow-up questions could have a positive impact (i.e., decrease skip errors) for these same respondents. Results would show no effect because they were unable to differentiate the individual effects.

Smyth and colleagues (2011) looked at the effect of adding visual design elements to skip patterns on skip errors for low-literacy respondents. They found that indenting the follow-up questions and adding arrows had no effect on the percent of respondents with skip errors. However, like the Gohring and Smyth (2013) study, they tested multiple design changes at once. Therefore, more research is needed as it is possible that using other visual design elements intended to appeal to a respondent's spatial ability in combination with written instructions will assist respondents with low linguistic ability.

1.2.7 Respondent Motivation in Survey Research

Regardless of a respondent's ability to complete a survey, they still need to be motivated to complete the task (Beatty and Herrmann, 2002). Unmotivated respondents may satisfice resulting in poor quality data (Krosnick, 1991; Olson,

2013); these respondents are less motivated to accurately complete a survey. This lack of motivation for accuracy can result in higher error rates on complex survey tasks that require extra effort, such as skip patterns.

Motivation is hard to measure explicitly, therefore researchers commonly use two proxies for motivation in surveys—topic saliency and the number of contacts required before the survey is returned (Groves et al., 2000, 2004; Olson, 2013; Smyth et al., 2009). Researchers have found that the topic of the survey is one of the major factors affecting whether respondents choose to respond to a survey (Groves et al., 1992, 2000, 2004). The topic of the survey and of each question can also have an impact on responses to individual questions (Stern et al., 2012; Holland and Christian, 2009; Beatty and Herrmann, 2002; Krosnick, 2002). For example, respondents who are not as interested in the topic of a particular question, may choose to select a "don't know" or "no opinion" option, or they may not respond to the question at all (Krosnick, 2002; Stern et al., 2012; Holland and Christian, 2009). This can lead to nonresponse bias if the reason for the nonresponse is related to the characteristic being measured (Groves and Peytcheva, 2008; Stern et al., 2012).

Stern and colleagues (2012) examined the effect of questionnaire design elements on both motivated and unmotivated respondents. The survey was focused on opinions about the community, and Stern and colleagues argued that the topic of the survey is more salient to respondents who report high community engagement (i.e., motivated) compared to respondents who report low community engagement (i.e., unmotivated). They found that respondents with lower community engagement were more affected by the design change to that question compared to respondents with higher community engagement. For example, they tested the inclusion of a "don't know" response option for a scalar question and

found that respondents for whom the topic was not as salient selected "don't know" at a higher rate when it was present compared to respondents who found the topic salient. Their results also showed similar findings when comparing the visual design change of different size boxes for open-ended questions. Specifically, respondents for whom the topic was salient provided about the same number of words in both the bigger and smaller boxes. On the other hand, respondents for whom the topic was not as salient provided more words when presented with the bigger box compared to when they were presented with the smaller box. This research suggests that less motivated respondents rely on the question design more compared to more motivated respondents. Therefore, using visual design elements on complex survey tasks, such as skip patterns, can increase data quality for respondents with less topic saliency.

Another proxy for motivation is the number of contacts used to get a response (Dillman et al., 2014; Smyth et al., 2009; Olson, 2013). Early responders (i.e., those that return the survey after only one mailing) are considered to be more motivated as they complete the survey when first asked, while late responders (i.e., those that return the survey after two or three mailings) are considered less motivated because it takes multiple requests before they respond to the survey. Research shows that late responders have more item nonresponse and worse quality responses (e.g., shorter open-ended responses) than early responders (Olson, 2013; Smyth et al., 2009).

Smyth and colleagues (2009) found that visual design can increase response quality for late responders to a web survey. Specifically, their study examined the effect of the size of the answer box for open-ended questions on the number of themes provided in the answer as well as the length of the answer. They found that while early responders had high quality data (respondents provided many words

and themes) regardless of the visual design, the quality of responses for late responders was significantly better with the visual design aid and was closer to the quality of the early responders' answers (i.e., more words and themes in the larger answer box compared to the smaller answer box).

On other questionnaire tasks, adding visual design elements may also differentially affect early and late responders. Specifically, using visual grouping elements in skip patterns could help simplify and clarify the response task and navigational path, making it less complex. This then could encourage less motivated respondents to attempt the skip patterns and follow them correctly, thus decreasing skip errors among this subgroup.

1.3 **Research Hypotheses**

Based on this previous research, I developed a set of hypotheses for how the visual grouping principles of common region, proximity, and similarity applied to the skip patterns will accomplish the goal of decreasing the three skip pattern error rates: (1) item nonresponse to the filter question, (2) omission errors, and (3) commission errors. Each of the three visual grouping elements focused on in this dissertation (enclosure, indentation, and sub-numbering) is hypothesized to assist respondents in navigating the skip patterns and reduce skip pattern errors overall, and differentially for respondents with different levels of linguistic ability and motivation.

1.3.1 Hypotheses for Overall Effects

Separate enclosure is a visual element that can be detected by its contrast and shape relative to the surrounding elements, and respondents will detect it during the first stage of visual processing. Visual elements picked up in the early stages of

visual processing provide a foundation for organizing the information on the page. This foundation helps respondents navigate the page during attentive processing, thus reducing errors. Therefore, I hypothesize that using separate enclosure for the follow-up questions will decrease item nonresponse to the filter question, as well as rates of omission and commission errors on the follow-up questions compared to not using separate enclosure (H2.1).

Indentation of the follow-up questions is not an element with distinct contrast and shape such as enclosure. Therefore, it is less likely to be detected during the first stage of pre-attentive processing. Instead, respondents need to use top-down processing, which occurs during the second stage of visual processing, to identify the indentation. During top-down processing, respondents draw on previous knowledge and context to glean meaning from the indentation. Specifically, respondents learn the patterns of the survey and the visual design elements at the beginning of the survey; for example, they learn that the next question will start at the left margin (Ware, 2012; Dillman et al., 2014; Jenkins and Dillman, 1997). When indentation is present, respondents will see the next questions are not at the left margin and understand that these questions belong to a different group, helping them recognize the need to change their navigation. Therefore, I hypothesize that using indentation for the follow-up questions will decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to not using indentation (H2.2).

Sub-numbering the follow-up questions is different from both enclosure and indentation in that respondents need to read the question to see and process the question number. This means respondents must use attentive processing (stage four of visual processing) to process sub-numbering; it will not be picked up during pre-attentive processing. Respondents need to first learn how the questions are

numbered throughout the questionnaire, and then see that the sub-numbering of the follow-up questions deviates from that pattern and thus they belong to a separate group. Although sub-numbering requires further processing compared to enclosure or indentation, it is still a visual grouping mechanism and one that can be considered common knowledge to respondents. Therefore, I hypothesize that using sub-numbering for the follow-up questions will decrease item nonresponse to the filter question, as well as rates of omission and commission errors on the follow-up questions compared to not using sub-numbering (H2.3).

In the forms with multiple visual elements, the elements build off and reinforce each other. As argued above, each element is processed by respondents during a different stage of visual processing: separate enclosure is processed in the first stage, indentation is processed in the second stage, and sub-numbering is processed in the fourth stage. As such, respondents continually receive reinforcement while visually processing the skip pattern, and are primed to look for other cues that can further assist in the navigation of the skip patterns.

With enclosure and indentation, respondents first see the contrast of the separate enclosure and then identify that the questions and this separate enclosure element are not at the left margin like previous questions. At this stage, respondents are using the combination of the contrast of the separate enclosure with top-down processing to further identify the separate grouping of the follow-up questions. Therefore, I hypothesize that the use of both enclosure and indentation will further decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to using only enclosure or indentation (H2.4).

Sub-numbering occurs later in visual processing and requires using attentive processing compared to enclosure and indentation. Combining sub-numbering with

enclosure, indentation, or both provides cues to the respondent during both pre-attentive and attentive processing. This addition of elements at both levels of processing reinforces the separate grouping of the follow-up questions and further improves the effects of the individual elements. Therefore, I hypothesize that the use of both enclosure and sub-numbering (H2.5), indentation and sub-numbering (H2.6) and all three visual elements (enclosure, indentation, and sub-numbering—H2.7) will further decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to using only enclosure, indentation, or sub-numbering.

1.3.2 Hypotheses for Differences in Respondent Linguistic Ability

In addition to reducing skip errors overall, visual grouping techniques could be helpful in reducing skip errors for specific subgroups of respondents. Previous research shows that respondents with low linguistic abilities have higher errors rates on complex survey tasks compared to respondents with high linguistic abilities (Knauper, 1999; Narayan and Krosnick, 1996; Al-Tayyib et al., 2002). As skip patterns can be considered a complex survey task, I hypothesize that respondents with lower linguistic abilities will have more skip errors across all treatments than their counterparts with higher linguistic abilities (H3.1).

Although respondents with low linguistic abilities are hypothesized to have higher error rates overall, the inclusion of visual design elements could decrease the rates of error for these respondents. Specifically, using separate enclosure and indentation can help respondents with lower linguistic abilities because these visual elements are spatially related. This means that respondents notice them during the pre-attentive stage of visual processing and they do not need to rely on attentive processing and linguistic ability to comprehend the instructions (Gardner, 1983;

Carroll, 1993; Ware, 2012). Respondents with high linguistic ability, on the other hand, already have low error rates because they utilize the existing written instructions and symbols. This means that while high linguistic ability respondents may see and utilize the added visual design elements, we do not expect to see a large decrease in error rates for these respondents compared to the lower linguistic ability respondents. Therefore, I hypothesize that using separate enclosure (H3.2) or indentation (H3.3) for the follow-up questions will reduce skip errors further for respondents with low linguistic abilities compared to respondents with high linguistic abilities.

Sub-numbering on the other hand is processed during attentive processing and utilizes a respondent's linguistic ability instead of spatial ability (Gardner, 1983; Ware, 2012). Therefore, respondents with low linguistic ability may have more difficulty analyzing the sub-numbering than respondents with high linguistic ability. As a result, I hypothesize that using sub-numbering for the follow-up questions will reduce skip errors further for respondents with high linguistic abilities compared to respondents with low linguistic abilities (H3.4).

When looking at the combination form of enclosure and indentation, the multiple visual elements will build off each other and create even greater effects for respondents. Enclosure is identified during the first stage of visual processing and indentation is identified during the second stage of visual processing. The continuing reinforcement of these cues during pre-attentive processing will further assist respondents. In particular, these cues will be identified subconsciously and are using the spatial ability of respondents instead of their linguistic ability. As a result, I hypothesize that the combination form of enclosure and indentation will decrease skip errors further for respondents with low linguistic abilities compared to respondents with high linguistic abilities (H3.5).

The combination forms of enclosure and sub-numbering, indentation and sub-numbering, and enclosure, indentation and sub-numbering each include visual design elements that are hypothesized to have opposite effects (enclosure and indentation assist low linguistic ability respondents further while sub-numbering assists high linguistic ability respondents further). Because of these counteracting elements, I do not hypothesize any differential effects on the skip pattern error rates for combination forms featuring sub-numbering across low and high linguistic ability respondents.

1.3.3 Hypotheses for Differences in Respondent Motivation

Even though respondents with lower linguistic ability have difficulty, there are still some of these respondents who can accomplish the task with no errors. On the other hand, some respondents with high linguistic ability may have skip errors. Therefore, there may be other factors that lead to respondents producing skip errors. One possible factor is motivation. Previous literature indicates that respondents for whom the survey topic is less salient and respondents who respond after multiple contacts (late responders) have higher rates of item nonresponse and worse quality data (Stern et al., 2012; Holland and Christian, 2009; Beatty and Herrmann, 2002; Krosnick, 2002; Dillman et al., 2014; Smyth et al., 2009; Olson, 2013). Therefore, those for whom the survey is less salient or require more contacts may also be reluctant to carry out complex survey tasks such as navigating skip patterns. I hypothesize that respondents who are less motived (i.e., lower salience or respond after multiple contacts) will have more skip errors than those who are more motivated (i.e., higher salience or respond after a single contact—H4.1).

Additional research has found that less motivated respondents (i.e., lower salience and late respondents) are more affected by visual design elements (Stern

et al., 2012; Smyth et al., 2009). Using visual grouping elements in skip patterns could help simplify and clarify the response task and navigational path, making it less complex. This then could encourage less motivated respondents to attempt the skip patterns and follow them correctly, thus decreasing skip errors among this subgroup. Additionally, using visual design elements that are identified during pre-attentive processing could assist less motivated respondents as they do not need to focus on and analyze these elements to perceive them and use them as grouping mechanisms. More motivated respondents, on the other hand, are already hypothesized to have low error rates because they utilize the existing written instructions and symbols. This means that while more motivated respondents may see and utilize the added visual design elements, we do not expect to see a large decrease in the rate of errors for these respondents. Therefore, because separate enclosure and indentation are spatial elements typically identified during pre-attentive processing, I hypothesize that using separate enclosure (H4.2) or indentation (H4.3) will decrease skip errors further for respondents who are less motivated to complete the survey compared to respondents who are more motivated to complete the survey.

Identifying and processing sub-numbering occurs at the attentive level of processing. As such, respondents who are less motivated and less willing to devote attention and effort to processing will not use this information as much as respondents who are more motivated. Therefore, I hypothesize that using sub-numbering for the follow-up questions will reduce skip errors further for the more motivated respondents compared to the less motivated respondents (H4.4).

For the combined forms, the multiple visual elements will build off each other and thus create even greater effects for respondents of differing motivation levels. Because enclosure is identified during the first stage of visual processing and

indentation is identified during the second stage of visual processing, these elements will provide continuing reinforcement during pre-attentive processing. These continuous cues will further assist respondents when navigating the questionnaire, and because they are identified subconsciously, they will not require extra effort by the less motivated respondents. Therefore, I hypothesize that the combination form of enclosure and indentation will decrease skip errors further for respondents who are less motivated to complete the survey compared to respondents who are more motivated to complete the survey (H4.5).

The combination forms of enclosure and sub-numbering, indentation and sub-numbering, and enclosure, indentation and sub-numbering each include visual design elements that are hypothesized to have opposite effects (enclosure and indentation assist less motivated respondents further while sub-numbering assists more motivated respondents further). Because of these counteracting elements, I do not hypothesize any differential effects on the skip pattern error rates for combination forms featuring sub-numbering across respondents with differing levels of motivation.

1.4 **Research Methods**

This dissertation focuses on determining if visually grouping questions through the use of common region (i.e., enclosure), indentation (i.e., proximity), and/or sub-numbering (i.e., similarity) decreases error rates in skip patterns. To test these hypotheses, two experiments were conducted. The first experiment was implemented in an eight-page mail survey (labor survey) conducted by the Bureau of Sociological Research at the University of Nebraska—Lincoln (UNL) for the Nebraska Department of Economic Development (NDED). The second experiment was embedded in a four-page mail survey (UNL survey) developed and fielded by

the author primarily for the purpose of this research. The labor survey examined all three visual grouping elements while the UNL survey only examined enclosure and indentation due to funding constraints. The previously stated hypotheses and reasoning for the forms without sub-numbering are the same for both surveys. Only the labor survey will examine the hypotheses that include sub-numbering.

1.4.1 Labor Survey

The Labor Survey was designed to understand the labor market in Northeastern Nebraska. The questionnaire included ten skip patterns (including nested skip patterns) and was sent to a sample of 12,000 households located in Northeastern Nebraska and the Sioux City area of Iowa and South Dakota. These households were randomly selected from the USPS Computerized Delivery Sequence File (CDSF). The next birthday method (Gaziano, 2005) was used to select a member of each household to complete the survey. Additionally, to increase response rates, this study used the Tailored Design Method (Dillman et al., 2014) with five mailings: a pre-notice, an initial questionnaire mailing, a follow-up postcard, and two follow-up mailings with replacement questionnaires sent to non-respondents. The labor survey was fielded from October through December 2013.

Sample members were randomly assigned to one of the eight experimental treatments (see Figures 1.3 and 1.4 for an example skip pattern in each treatment; see Appendices B-I for the full questionnaires for the labor survey) in which the content of the questionnaire was held constant but the design of skip pattern was altered. Each experimental treatment was sent to 1,500 households. Response rates (AAPOR RR1) by treatment ranged from 24.8% to 28.1% and do not significantly differ across treatments (χ^2=6.46, p=0.49; Table 1.1).

Table 1.1: Number of Respondents and Response Rates by Experimental Treatment for the Labor Survey

Treatment	**Assigned Sample Size**	**Number of Respondents**	AAPOR **RR1**
Control	1500	391	26.1%
Enclosure Only	1500	389	25.9%
Indentation Only	1500	418	27.9%
Sub-Numbering Only	1500	394	26.3%
Enclosure and Indentation	1500	372	24.8%
Enclosure and Sub-Numbering	1500	398	26.5%
Indentation and Sub-Numbering	1500	422	28.1%
Enclosure, Indentation and Sub-Numbering	1500	383	25.5%
Total	12 000	3167	26.4%
			$\chi^2 = 6.46$, p = 0.49

The labor survey implemented a 2^3 factorial design where the three factors are separate enclosure, indentation, and sub-numbering. As shown in form 1 of figure 1.3, the control treatment consists of the detection method from Redline and colleagues (2003) where there are bold instructions with an arrow leading to the next question to be answered as well as an "If yes," or "If no" cue at the beginning of the next question. To test both the main and interaction effects of enclosure, indentation, and sub-numbering on skip errors, seven other forms were designed (Figure 1.3). Form 2 uses enclosure (common region) to communicate that the follow-up questions belong together and are separate from the other questions. Form 3 examines the effect of grouping through indentation (proximity) of the follow-up questions compared with the other items. Form 4 incorporates sub-numbering (similarity) for the follow-up questions with continuous numbering for the other questions. The remaining forms have combinations of these grouping

methods to test the combined effects. In figure 1.4, form 5 uses the combination of enclosure and indentation, form 6 examines the combination of enclosure and sub-numbering, form 7 uses the combination of indentation and sub-numbering, and form 8 combines all three elements. In addition, examining the size of the individual and combined effects will help determine whether the combined effects are additive or interactive.

1.4.2 UNL Survey

The second experiment (UNL survey) was fielded July through October 2014 (after the labor survey). This study was funded with a Doctoral Dissertation Research Improvement Grant (DDRIG) from the NSF (SES-1357554) with a sample of 3,000 Nebraska residents. The households were drawn from the USPS Computerized Delivery Sequence File (CDSF) using a stratified simple random sample with proportionate allocation. There were two strata, one for respondents living in a county in southeast Nebraska near UNL[4] and another for respondents living in the rest of the state. The next birthday method was used to select a member of each household to complete the survey (Gaziano, 2005).

To encourage response, the UNL survey was designed to take advantage of the study's affiliation with the University of Nebraska—Lincoln (UNL). The four-page questionnaire asked respondents about UNL and its connection to the community through events and research. Additionally, this survey was implemented using the Tailored Design Method (Dillman et al., 2014) with four mailings: an initial invitation, a follow-up postcard, and two follow-up mailings, each with a replacement questionnaire sent to non-respondents. Due to low response rates after

[4]The counties located in southeast Nebraska near UNL are Butler, Cass, Dodge, Douglas, Fillmore, Gage, Jefferson, Johnson, Lancaster, Nemaha, Otoe, Pawnee, Polk, Richardson, Saline, Sarpy, Saunders, Seward, Thayer, Washington, and York.

the first follow-up mailing, the final follow-up mailing included a $1 incentive to increase response rates and therefore, power for the analyses.

Each sample household was randomly assigned to one of four experimental treatments (see Figure 1.5 for an example skip pattern in each treatment; see Appendices J-M for the full questionnaires for the UNL survey), resulting in a sample size of 750 per experimental treatment. Response rates (AAPOR RR1) by treatment ranged from 35.6% to 36.4%, resulting in 267 to 273 respondents per treatment. The response rates do not significantly differ across all treatments (χ^2=0.12, p=0.99; see Table 1.2).

Table 1.2: Number of Respondents and Response Rates by Experimental Treatment for the UNL Survey

Treatment	**Assigned Sample Size**	**Number of Respondents**	**AAPOR RR1**
Control	750	270	36.0%
Enclosure Only	750	272	36.3%
Indentation Only	750	267	35.6%
Enclosure and Indentation	750	273	36.4%
Total	3000	1082	36.1%
			$\chi^2 = 0.12$, p = 0.99

Since the UNL survey was fielded after the labor survey, I was able to learn from the labor survey's limitations. Specifically, the labor survey had two main limitations stemming from having set content and questions due to the client's purpose of the survey. First, all ten of the skip patterns had a behavioral filter question and behavioral follow-up questions. Research has shown that there are different processes used when respondents answer behavioral questions versus attitudinal questions (Tourangeau et al., 2000). In particular, behavioral questions

are more dependent on recall than attitudinal questions. Second, eight of the skip patterns had open-ended follow-up questions. In general, open-ended questions have a high percentage of item nonresponse (Dillman et al., 2014; Israel and Lamm, 2012; Millar and Dillman, 2012). Therefore, only examining open-ended follow-up questions can lead to incorrect understanding of the effects that visual design has on skip errors. The UNL survey addressed these limitations by examining the effects of separate enclosure and indentation with skip patterns that incorporated both attitudinal and behavioral filter and follow-up questions as well as open and closed-ended follow-up questions.

The UNL survey implemented a 2^2 factorial design where the two factors are separate enclosure and indentation. As shown in form 1 of figure 1.5, the control treatment consists of the detection method from Redline and colleagues (2003). To test both the main and interaction effects of enclosure and indentation three other forms were designed. Form 2 uses enclosure (common region) to communicate that the follow-up questions belong together and are separate from the other questions. Form 3 examines the effect of grouping through indentation (proximity) of the follow-up questions compared with the other items. Form 4 combines both enclosure and indentation. In addition, examining the size of the individual and combined effects will help determine whether the combined effects are additive or interactive.

1.4.3 Operationalization of Measures and Outcomes

As previously mentioned, three types of error are examined in this chapter: item nonresponse to the filter question, omission errors, and commission errors. To measure these error types, two indicator variables are created based on how respondents answered each question in each skip pattern in each survey. The first

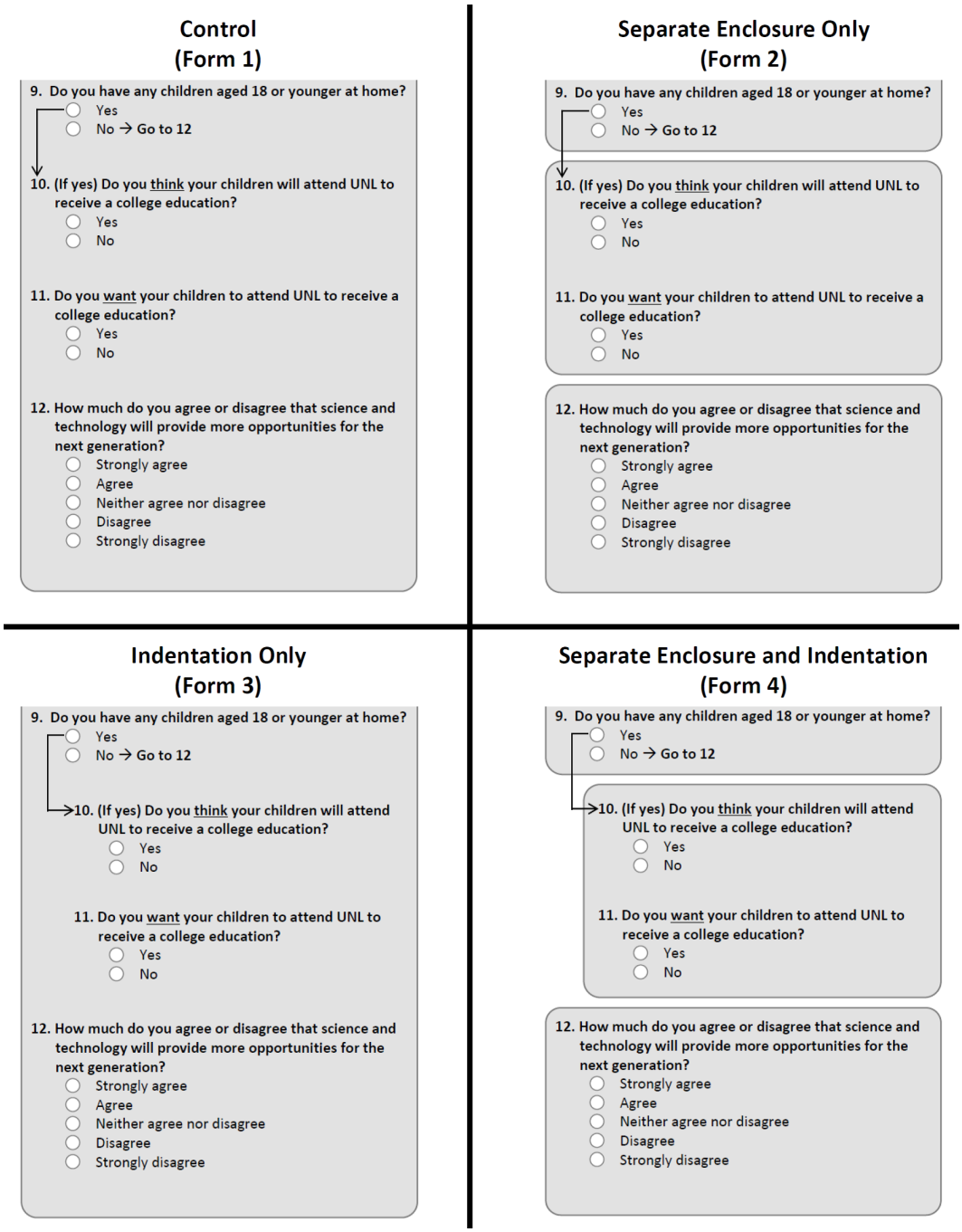

Figure 1.5: Example of a Skip Pattern with Grouping Principles for Each Experimental Treatment in the UNL Survey

variable is binomial, capturing whether respondents failed to answer the filter question (1) or answered the filter question (0). The second variable is a multinomial variable indicating if the respondent had omission errors on the follow-up questions (1), had commission errors on the follow-up questions (2), or had no errors on the follow-up questions (0). Both indicator variables can take on a missing value if the respondent was not eligible to commit an error for that skip pattern. For example, if a skip pattern is nested within another skip pattern, respondents screened out of answering the follow-up questions would not be eligible to commit an error on the nested skip pattern and therefore are assigned a missing value for both indicator variables. Additionally, respondents who had item nonresponse on the filter question were assigned a missing value for the omission-commission variable as it was not possible to determine if the respondent had committed an error or not on the follow-up questions.

Because the surveys have multiple skip patterns, the data is structured in a "long" or "nested" structure. In a long format dataset, the data for each respondent is kept in multiple rows where each row represents a skip pattern within the respondent. For example, in the labor survey there are ten skip patterns, so each respondent has ten rows of data. This type of structure allows me to calculate the overall proportion of skip patterns in which each type of error was made by dividing the counts of errors by all eligible skip patterns in each survey.

This dissertation also examines differences in error rates across respondent characteristics of linguistic ability and motivation. To measure linguistic ability, this study uses proxies consistent with previous research: age, education, and literacy (Knauper et al., 1997; Knauper, 1999; Krosnick, 1991; Krosnick et al., 1996; Narayan and Krosnick, 1996; Al-Tayyib et al., 2002; Olson et al., 2011; Smyth et al., 2011). Both the UNL and the labor surveys ask respondents what year they

were born, so the respondents' age is calculated by subtracting the respondents' year of birth from the year the survey was fielded and then coded into a dichotomous variable. Previous studies measuring age effects used a cut off for old and young respondents of 60 (Stern et al., 2007) or 65 (Knauper, 1999). Because the labor survey asks about the respondent's current job status and other job related questions, it is important to have working respondents in both age groups. As the current retirement age to receive social security benefits in the US is around 66 years old, the dichotomous age variable will use an age cut off of 60 years. This will allow for respondents in each age group to take both paths of a skip pattern that filters based on the respondent's job status. This age variable is then defined as (1) 60 years old or older, and (0) less than 60 years old.

To measure education, the labor survey had a series of yes/no questions that asked about whether or not the respondent had obtained each level of education. For example, there were separate questions for high school graduate and for receiving a graduate degree. From this set of questions, I identify the highest degree the respondent obtained, by taking the highest degree the respondent marked with a "yes" as the value of the new highest degree variable. For example, respondents who marked "yes" to "High School diploma", "Associate's degree", and "Bachelor's degree" would have a highest degree of "Bachelor's degree". The UNL survey asked respondents what their highest degree or level of schooling they completed is with a single ordinal question. Both of these highest degree variables are then recoded into two groups: (1) less than college degree and (0) a Bachelor's or graduate degree.

The Self-Administered Literacy Index (SALI—Olson et al., 2011) is used as a measure of literacy in the UNL survey. The SALI is a scale of five items, which ask about the respondent's English understanding, reading, and writing as well as the type and number of reading materials in the respondent's home. Respondents are

then scored based on their answers to the five questions, resulting in a scale from 0—where respondents have no reading material in the house and do not understand, read, or write English very well—to 5 where respondents have many books and other reading materials in the house and understand, read, and write English very well. Respondents are then classified into high and low literacy categories where a score of 4 or 5 means respondents have high literacy abilities (coded as 0), and a score of 0, 1, 2, or 3 means respondents have low literacy abilities (coded as 1). The SALI questions were not asked in the labor survey; therefore, literacy is only examined for the UNL survey.

Motivation cannot be measured directly, therefore, two proxies were used in this dissertation: topic salience and number of contacts required before the completed survey is returned (Groves et al., 2000, 2004; Stern et al., 2012; Smyth et al., 2009; Olson, 2013). For the number of contacts required before the completed survey is returned, respondents in both surveys could have received up to three questionnaires. Therefore, early responders (coded as 0) are considered to be those who returned the survey after receiving the first questionnaire mailing, while those who returned it after receiving the second or third questionnaire (i.e., the follow-up mailings) are considered late responders (coded as 1).

The second proxy for motivation is topic salience. For the labor survey, the respondents' employment status was used as the measure of topic salience because the majority of questions in the survey were relevant to those who are employed or are looking to reenter the workforce. Therefore, respondents who say they are employed or are likely to reenter the workforce are expected to already be motivated to respond (coded as 0), and respond accurately, based on the topic of the survey—specifically its relevance to their current employment status and goals (Groves et al., 2000; Dillman et al., 2014; Stern et al., 2012). On the other hand,

respondents who are not employed and not likely to reenter the workforce are expected to be less motivated (coded as 1) and therefore less inclined to respond accurately as the survey is not focused on their current employment status and goals.

Three questions were asked in the labor survey about the respondents' employment status and goals. The first question asked if they were currently employed, unemployed, retired, or a homemaker (Appendix B: Question 1). The second question asked of those who were not currently employed if they were looking to reenter the workforce (Appendix B: Question 13). The third question asked both employed respondents and respondents who are looking to reenter the workforce how likely or unlikely they are to change jobs or reenter the workforce in the next year (Appendix B: Question 31). I used responses from these three questions to classify the respondents into two motivational groups (more motivated and less motivated respondents). Table 1.3 shows how the responses to each of these questions maps to the motivation groups.[5]

The UNL survey asked questions about the respondents' opinions and connections with the University of Nebraska—Lincoln (UNL). This connection with UNL is hypothesized to be based on the respondents' location in the state. Respondents who live closer to UNL are thought to have a stronger connection with the university because they can easily travel to the university and news about the university is considered local news. Respondents living elsewhere in the state are hypothesized to have a weaker connection with the university because it takes more

[5]Respondents who selected opposite options to the questions asking if they were looking to reenter the workforce and their likelihood to reenter the workforce were classified as missing for this motivation proxy due to the discrepancy in their data. 50 (1.7%) respondents were classified as such. Additionally, there were 114 (3.8%) respondents classified as missing due to missing data for the employment status question or missing data for both the looking to reenter and the likelihood of change or reenter questions.

Table 1.3: Motivation classification for topic salience proxy based on respondent answers to three questions in the Labor survey

Employment Status	**Looking to Reenter**	**Likelihood of change or reenter**	**Motivation Classification**	**Percent of Respondents**
Employed	—	Any response	More Motivated	60.6%
Unemployed, Retired, Homemaker	Yes	Very Likely, Likely	More Motivated	2.8%
Unemployed, Retired, Homemaker	Yes	—	More Motivated	0.1%
Unemployed, Retired, Homemaker	—	Very Likely, Likely	More Motivated	0.2%
Unemployed, Retired, Homemaker	No	Very unlikely, Unlikely, Neutral	Less Motivated	1.4%
Unemployed, Retired, Homemaker	—	Very unlikely, Unlikely, Neutral	Less Motivated	29.0%
Unemployed, Retired, Homemaker	No	—	Less Motivated	0.5%

Note: "—" refers to missing data for that question

effort to hear about and travel to the university. Therefore, to measure the motivation proxy of topic salience, the UNL survey used the mailing address for the respondent. Specifically, respondents living in Southeast Nebraska (i.e., near UNL) are considered more motivated than respondents living elsewhere in the state. To measure this, I used the respondents' zip code. Any zip code within counties in Southeast Nebraska[6] were considered close to UNL.

1.5 **Dissertation Outline**

1.5.1 Chapter 1: Introduction

The first chapter provided an overview of the dissertation. This included a literature review as well as the methods used to conduct the two experiments.

1.5.2 Chapter 2: Overall Effect of Visually Grouping Skip Patterns

The second chapter will examine the overall effect of the visual grouping of questions on the error rates. Specifically, this chapter will be a standalone article that discusses the literature, methods and results from both surveys conducted. My hypotheses for the overall effect of visually grouping skip pattern questions on skip errors are:

H2.1: Using separate enclosure for the follow-up questions will decrease item nonresponse to the filter question, as well as rates of omission and commission errors on the follow-up questions compared to not using separate enclosure.

H2.2: Using indentation for the follow-up questions will decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to not using indentation.

[6]Butler, Cass, Dodge, Douglas, Fillmore, Gage, Jefferson, Johnson, Lancaster, Nemaha, Otoe, Pawnee, Polk, Richardson, Saline, Sarpy, Saunders, Seward, Thayer, Washington, York

H2.3: Using sub-numbering for the follow-up questions will decrease item nonresponse to the filter question, as well as rates of omission and commission errors on the follow-up questions compared to not using sub-numbering.

H2.4: Use of both enclosure and indentation will further decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to using only enclosure or indentation.

H2.5: Use of both enclosure and sub-numbering will further decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to using only enclosure or sub-numbering.

H2.6: Use of both indentation and sub-numbering will further decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to using only indentation or sub-numbering.

H2.7: Use of all three visual elements (enclosure, indentation, and sub-numbering) will further decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to using only enclosure, indentation, or sub-numbering.

1.5.3 Chapter 3: Effects of Visually Grouping Skip Patterns on Navigational Errors among Respondents with Different Levels of Cognitive Ability

The third chapter will examine the effect of visually grouping skip pattern questions on the error rates for respondents with different cognitive abilities. As

with Chapter 2, Chapter 3 will be a standalone article that discusses the literature, methods and results from both surveys conducted. My hypotheses are as follows:

H3.1: Respondents with lower linguistic abilities will have more skip errors across all treatments than their counterparts with higher linguistic abilities.

H3.2: Using separate enclosure for the follow-up questions will reduce skip errors further for respondents with low linguistic abilities compared to respondents with high linguistic abilities.

H3.3: Using indentation for the follow-up questions will reduce skip errors further for respondents with low linguistic abilities compared to respondents with high linguistic abilities.

H3.4: Using sub-numbering for the follow-up questions will reduce skip errors further for respondents with high linguistic abilities compared to respondents with low linguistic abilities.

H3.5: The combination form of enclosure and indentation will decrease skip errors further for respondents with low linguistic abilities compared to respondents with high linguistic abilities.

1.5.4 Chapter 4: Using Visual Design Grouping Principles to Improve Data Quality of Skip Patterns for Less Motivated Respondents

The fourth chapter will examine the effect of visually grouping skip pattern questions on the error rates for respondents with different motivation levels. Motivation is measured by topic saliency as well as the number of mailings needed for respondents to return the survey. This chapter will discuss the literature, methods and results from both surveys conducted. My hypotheses are as follows:

H4.1: Respondents who are less motived (i.e., lower salience or respond after multiple contacts) will have more skip errors than those who are more motivated (i.e., higher salience or respond after a single contact).

H4.2: Using separate enclosure will decrease skip errors further for respondents who are less motivated to complete the survey compared to respondents who are more motivated to complete the survey.

H4.3: Using indentation will decrease skip errors further for respondents who are less motivated to complete the survey compared to respondents who are more motivated to complete the survey.

H4.4: Using sub-numbering for the follow-up questions will reduce skip errors further for respondents who are more motivated to complete the survey compared to respondents who are less motivated to complete the survey.

H4.5: The combination form of enclosure and indentation will decrease skip errors further for respondents who are less motivated to complete the survey compared to respondents who are more motivated to complete the survey.

1.5.5 Chapter 5: Conclusion

Finally, the fifth chapter will contain the summary of this dissertation. This will include a summary of the results from chapters 2, 3 and 4, the significance of these findings, and the limitations of this research. Additionally, this final chapter will include discussion of future research that can be done in this area and implications for survey practice.

Chapter 2: Overall Effect of Visually Grouping Skip Patterns

2.1 Introduction

With easy access to the United States Postal Service (USPS) Computerized Delivery Sequence File (CDSF)—a list of mailing addresses for U.S. households—survey researchers are increasingly using mail surveys. Because the CDSF covers over 95% of U.S. households (Iannacchione, 2011), and as of May 2016, 48.3% of households no longer have landline telephones (Blumberg and Luke, 2016), researchers are now able to obtain better coverage and response rates with mail surveys than with landline telephone surveys. Thus, many surveys are being switched to or started in mail. The use of the mail mode raises other important challenges, such as the need to help respondents navigate the questionnaire without interviewer assistance.

As not all questions asked are relevant to all respondents, skip patterns are introduced to navigate respondents around questions that do not apply to them. With no computers or interviewers to assist respondents in navigating the skip patterns correctly in a mail survey, respondents may commit one of three types of errors. Respondents can either fail to answer the follow-up questions when they should have answered them (errors of omission), answer the follow-up questions when they should have skipped them (errors of commission), or fail to answer the initial filter question (item nonresponse) due to being so focused on following the skip instructions. All of these types of errors result in higher rates of missing data because questions are either not answered or researchers cannot tell what respondents meant to answer and thus must code these questions as missing (Redline et al., 2003). In addition to losing important information, high missing data rates can undermine the statistical power needed for analyses, especially for

subgroup analyses.

The first published empirical piece on this topic reported the results of an experiment for the 2000 US decennial census where the addition of verbal and visual cues significantly decreased skip errors (Redline et al., 2003). Since this research was conducted, there has been enormous growth within survey methodology in understanding of how respondents process visual information. Specifically, survey methodologists have drawn on concepts from the visual sciences and cognitive psychology to better understand how visual design can be used strategically in questionnaire design (Dillman et al., 2014; Tourangeau et al., 2004).

This chapter presents the results of two experiments that tested three visual design features—enclosure, indentation, and sub-numbering—aimed at decreasing skip errors in mail surveys. Each design is intended to create stronger grouping and subgrouping among items within skip patterns, making the navigational path through them clearer and decreasing skip errors. The effectiveness of each design is assessed by examining rates of omission and commission errors as well as item nonresponse on the first question of the skip pattern (i.e., the filter question).

2.2 **Background**

2.2.1 Communicative Principles and Importance of Visual Information

One goal of conversations is to exchange information so that all participants understand what is being said. Therefore, conversations typically consist of multiple statements that logically flow from one to the next. In a cooperative conversation, each statement in the flow of the conversation should be relevant to all participants (relation), have sufficient information so the participants understand the statement (quantity), be truthful (quality), and be brief and orderly to avoid ambiguity (manner). These rules, or norms, that participants in a

conversation follow are called conversational maxims (Grice, 1975).

Participants who follow these four maxims in conversations are said to be cooperative communicators. Schwarz (1996) argued that surveys are a type of conversation and that survey respondents act as cooperative communicators. This means that they follow these maxims when completing a questionnaire and they assume the researcher is doing the same. For example, respondents follow the maxims of quantity and relation by assuming that the researcher provides just enough information to answer the questions and all the information provided is relevant to the questions. Therefore, respondents will not just limit themselves to interpreting the text, but will also assume that the visual features of the questionnaire are related to the response task. Researchers can use the fact that respondents are cooperative communicators to improve their design, by using visual features to provide instructions to help them answer the survey.

There are many studies that examine how respondents use visual information in various areas of survey research, such as visual context effects (Couper et al., 2004, 2007; Toepoel and Couper, 2011), open-ended questions (Smyth et al., 2009), date format questions (Christian et al., 2007), grid questions (Chesnut, 2008; Kaczmirek, 2011; Couper et al., 2013), and scalar questions (Couper et al., 2006; Tourangeau et al., 2004, 2007; Christian et al., 2009). In order to effectively use visual design features to assist respondents, researchers have turned to the vision sciences to better understand what respondents see and when they see it.

2.2.2 Visual Processing Principles: What Respondents See and When

Ware (2012) states there are four stages of visual processing viewers go through as they observe a visual scene and attempt to recognize patterns within it. As viewers proceed through these stages, they move from pre-attentive processing, where they

are subconsciously processing visual information, to attentive processing, where they are consciously processing the information. They also move from global processing of the entire visual scene to more focused and in-depth processing of individual elements within that scene.

The first three visual processing stages are part of pre-attentive processing where viewers are subconsciously processing the visual information. Stage one is called rapid parallel processing where viewers get a basic understanding of what they see (i.e., the overall global layout of a page in a mail survey). This includes identifying the size, color, contrast and shape of elements on the page as well as determining figure from ground. Viewers use a method of perception called bottom-up processing where they rely only on the sensory system (in this case, sight) and do not apply any prior information, context, or cultural meaning to take in and understand these elements (Jenkins and Dillman, 1997). In a self-administered survey, respondents (viewers) are able to discern the major characteristics of the elements on the page and determine which elements are part of the figure (e.g., the survey questions or instructions). This information is then used in later stages of visual processing as respondents know to focus on the figure elements while letting the rest fade into the background.

The second stage of visual processing is pattern perception where viewers divide the elements seen during rapid parallel processing (the first stage) into regions and apply top-down processing. In contrast to bottom-up processing, during top-down processing viewers use additional information to make sense of the elements. Specifically, they may draw on multiple elements on the page as well as their own expectations based on previous knowledge and experiences to understand the elements they are looking at. Viewers can also use their expectations to try to recognize groupings or patterns among these elements (Jenkins and Dillman, 1997).

These patterns generally follow one or more of the Gestalt laws of pattern perception. For example, elements that are close to each other follow the law of proximity and are perceived to be of the same group and different from elements that are not close (Ware, 2012). Other examples of the laws of pattern perception are elements that have common attributes (law of similarity), or are in the same enclosed space (law of common region).

The third stage of visual processing is when viewers hold the elements in their visual working memory. Viewers do not hold all elements at once but rather groups of elements and the rules defining those groups (laws of pattern perception) identified during pattern perception (the second stage). This way, when viewers do analyze individual items (in the fourth stage) they can easily recall the groupings and the defining rules.

During the fourth and final stage, viewers switch from pre-attentive processing (i.e., processing elements on a more sub-conscious level) to attentive processing, where they consciously process specific features on the page. Vision is greatly narrowed at this point, as viewers consciously focus on and analyze individual features in the visual field. As viewers read and look across the page, they are limited to sharply seeing only the elements that are inside their foveal view, which is the space of about a 2-degree visual angle or the width of about 9 characters (Jenkins and Dillman, 1997; Ware, 2012). Elements outside the foveal view are not in sharp focus for viewers and are less likely to be noticed.

2.2.3 Visual Design Principles: Rules for Questionnaire Design

Survey researchers can leverage the fact that respondents process different types of visual information at different times to help respondents navigate a questionnaire. Using visual processing theory, Jenkins and Dillman (1997) developed two

principles for helping respondents navigate questionnaires: (1) use multiple types of visual elements, and (2) use prominent visual guides to direct respondents. By using multiple types of visual elements, researchers can ensure that respondents see the elements at multiple stages of visual processing. For example, survey designers can use different shapes or colors that will be noticed and processed during pre-attentive processing in combination with text or numbers that will be noticed and processed during attentive processing. Christian and Dillman (2004) group these elements into four main types of visual languages: graphical, symbolic, verbal and numerical.

Within the survey context, graphical language refers to the appearance of the questions on the paper (e.g., spacing of questions and response options, use of images, or font size). Symbolic language refers to the use of symbols throughout the questionnaire (e.g., arrows). Verbal language is the actual words of the questions or instructions. Numerical language refers to numbers on the page such as the numbering of questions or response options. Graphical and symbolic languages tend to be identified and processed early, during pre-attentive processing, while verbal and numerical languages are typically processed during the later attentive processing stage (Ware, 2012). These language types can be used in conjunction to support one another throughout the processing stages as suggested by Jenkins and Dillman's first principle. Additionally, using graphical and symbolic languages provide a visual design aspect which can further assist respondents as suggested by Jenkins and Dillman's second principle. For example, the researcher can use two different languages, such as graphical and verbal, to communicate the skip instructions at multiple stages of the visual process and utilize visual design features. This then provides a strong visual stimulus and reiterates the importance of the skip pattern to respondents. However, it is important not to use too many

elements as multiple visual elements can clutter the page and cause confusion (Ware, 2012), which in the survey context may increase the probability respondents will make a mistake.

One can also incorporate usability ideas from Norman (2002) to help researchers design usable skip patterns. Norman described seven principles for making difficult tasks easy. He stated that tasks should (1) use common knowledge, (2) have simplified structure, (3) be visible, (4) have correct relationships, (5) use constraints efficiently, (6) prepare for errors, and (7) be standardized. Dillman and colleagues (2005) argue that these seven principles for usability of products apply to surveys as well, and provide examples of how researchers can use these principles in many different aspects of survey design. Using the examples put forth by Dillman and colleagues (2005), I developed a set of six rules that can be applied to the specific problem of designing usable skip instructions that will minimize errors:

1. Have correct relationships (Principle 4). To avoid unwanted errors, the skip instructions should be accurate and account for all possible paths. Each response option should have an associated path, and any follow-up questions should logically flow from the selected response option.

2. Have simplified structure (Principle 2) and use constraints efficiently (Principle 5). I combine principles 2 and 5 from Norman (2002) to create one rule for skip patterns. When designing skip patterns, researchers should limit the number of possible paths. Respondents should not be required to determine which path out of five is correct, for example, but rather only have two or three path options to navigate.

3. Be visible (Principle 3). Skip instructions should be visible to respondents when they need to use them. This means respondents should see the skip

instructions right after the filter question or next to the response options of the filter question so they know where to go next.

4. Use common knowledge (Principle 1). The skip instruction should use common and cultural knowledge. All elements used should have some prior meaning to respondents such as numbers or arrows.

5. Prepare for errors (Principle 6). Skip instructions should help respondents prevent or detect errors. Each element of the instruction should be there to guide respondents through the navigation of the skip pattern and help them correct any mistakes they may have made.

6. Standardize (Principle 7). Skip instructions should be consistent throughout the survey. This means that respondents can learn how to navigate during the first skip pattern and recognize the cues in subsequent skip patterns, thus reducing burden on the respondent.

2.2.4 Previous Research on Skip Patterns: Application of Visual Design Rules

There is supporting evidence for these principles and ideas in the limited research on skip instructions. For example, Christian and Dillman (2004), using only one element of the framework (Rule 3, making the instruction visible) and one type of language (verbal language), found that placing the skip instruction before rather than after the response options for a question increased the percentage of respondents who correctly navigated the skip pattern. However, their skip pattern was very simple.[1]

[1]In this example the authors did not have a filter question, but instead were using the skip instruction to tell respondents they did not need to answer the question if it did not apply to them (Christian and Dillman, 2004). See Appendix A for the question and visual design used in this experiment.

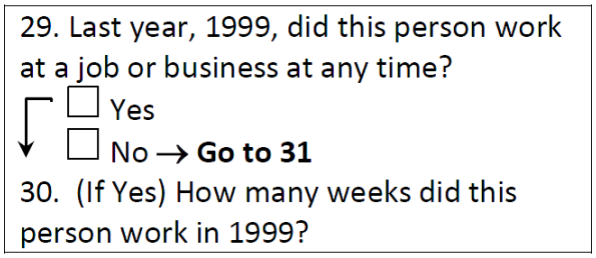

Figure 2.1: Example of detection method as used in Redline et al. (2003)

When more complex skip patterns are present in a survey, other design elements need to be considered. Redline and colleagues (2003) tested five skip instruction designs using multiple elements to determine which method reduced errors: "Skip to" instruction, "Go to" instruction, reverse print instruction, prevention instruction and detection instruction.[2] After testing these five methods, Redline and colleagues found that the detection instruction method (see Figure 2.1) provided the lowest percent of respondents with omission (4.0%) and commission (13.5%) errors compared to the other methods.[3]

The detection method uses many of the elements discussed in the framework for good navigation, such as prominent visual elements like bolded instructions (Rule 3), using common knowledge such as arrows to connect one question to the next (Rule 4), and helping respondents detect errors by providing "(If Yes)" at the beginning of the first follow-up question (Rule 5). Additionally, the detection method incorporates verbal language (i.e., "Go to 31") to tell respondents where to go alongside the symbolic language of arrows. Even though this method reduced

[2]Examples of all five methods are located in Appendix A.

[3]The "Skip to" instruction method had 19.7% commission and 5.0% omission errors. The "Go to" instruction method had 20.8% and 5.4% commission and omission errors respectively. The reverse print instruction method had commission errors of 17.9% and omission errors of 7.6%. Finally, the prevention method had 14.7% commission and 7.0% omission errors. All four methods significantly differed from the detection method for omission errors, and all but the prevention method differed from the detection method for commission errors (Redline et al., 2003).

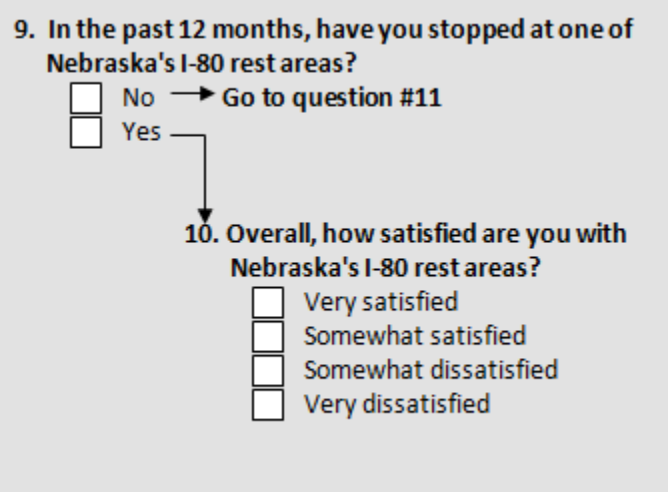

Figure 2.2: Example of a skip pattern from Gohring and Smyth (2013)

omission and commission errors, the percent of respondents making errors was still high (17.5% total).

Gohring and Smyth (2013) expanded on this research by changing three elements of the detection design. They (1) flipped the response options in the filter question, so that the response options that lead into the follow-up questions were on the bottom, (2) indented the follow-up questions to create a distinct visual grouping for them, and (3) changed the arrow leading from the response options into the follow-up questions from the left side of the response options to the right (see Figure 2.2). They found that this design decreased the commission errors for two of the six skip patterns they tested, but increased the omission errors for one of them. Because they made three design changes at once, it is impossible to tell which (if any) of the features were the most effective, and which (if any) were not at all effective.

2.2.5 Improving the Visual Design of Skip Patterns

There are two components to every skip pattern: the filter question and the follow-up questions. The previous research and experiments on skip patterns focus primarily on the design of the filter question and the elements of the corresponding skip instructions but not on the design of the follow-up questions. Incorporating design elements into both the filter and follow-up questions—in an effort to emphasize the relationship between these components—can help respondents differentiate between the follow-up questions and the questions everyone answers. One way to help respondents see this relationship is by creating visual subgroups that distinguish the two components.

Researchers can use the Gestalt laws of pattern perception to understand how respondents recognize visual patterns and thus how information can be displayed to create perceived groupings (Ware, 2012) that might assist respondents. In particular, this chapter focuses on the principles of common region (enclosure—Figure 2.3, Form 2), proximity (indentation—Figure 2.3, Form 3), and similarity (sub-numbering—Figure 2.3, Form 4), and compares skip patterns designed using these grouping principles to the detection method from Redline et al. (2003) which was the most effective design for both omission and commission errors in their research (Figure 2.3, Form 1). Each visual design treatment tested in this chapter incorporates multiple visual languages from Christian and Dillman (2004) as well as all six of the rules for designing usable skip instructions adapted from Norman (2002) and Dillman et al. (2005).

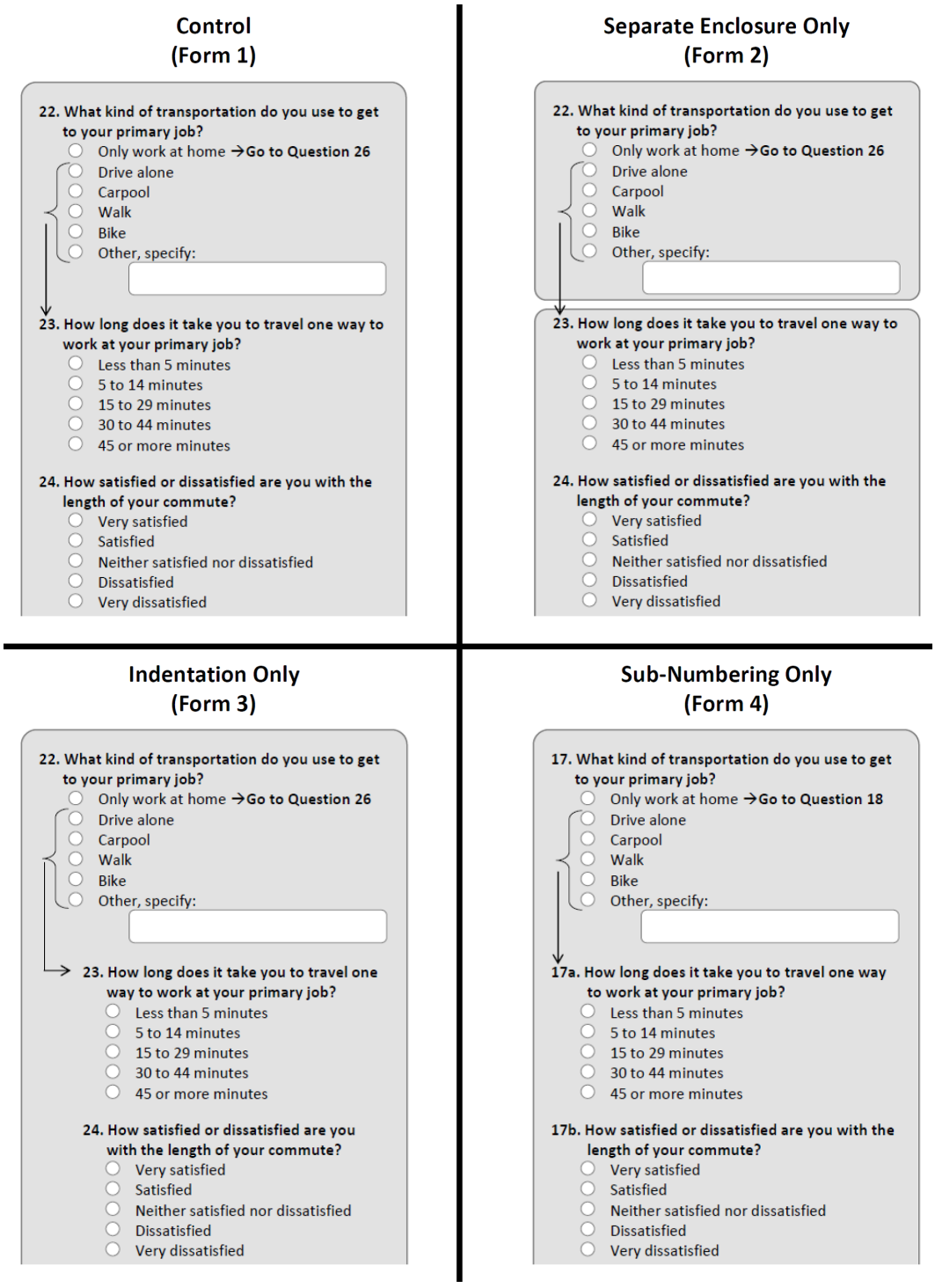

Figure 2.3: Example of skip pattern with single grouping elements for the labor survey

2.2.6 Hypotheses

I developed a set of hypotheses for how the visual grouping principles of common region, proximity, and similarity applied to the skip patterns will accomplish the goal of decreasing the three skip pattern error rates: (1) item nonresponse to the filter question, (2) omission errors, and (3) commission errors. Each of the three visual grouping elements focused on in this dissertation (enclosure, indentation, and sub-numbering) is hypothesized to assist respondents in navigating the skip patterns and reduce skip pattern errors. Specifically, separate enclosure is a visual element that can be detected by its contrast and shape relative to the surrounding elements, and respondents will detect it during the first stage of visual processing. Visual elements picked up in the early stages of visual processing provide a foundation for organizing the information on the page. This foundation helps respondents navigate the page during attentive processing, thus reducing errors. Therefore, I hypothesize that using separate enclosure for the follow-up questions will decrease item nonresponse to the filter question, as well as rates of omission and commission errors on the follow-up questions compared to not using separate enclosure (H2.1).

Indentation of the follow-up questions is not an element with distinct contrast and shape such as enclosure. Therefore, it is less likely to be detected during the first stage of pre-attentive processing. Instead, respondents need to use top-down processing, which occurs during the second stage of visual processing, to identify the indentation. During top-down processing, respondents draw on previous knowledge and context to glean meaning from the indentation. Specifically, respondents learn the patterns of the survey and the visual design elements at the beginning of the survey, for example that the next question will start at the left

margin (Ware, 2012; Dillman et al., 2014; Jenkins and Dillman, 1997). When indentation is present, respondents will see the next questions are not at the left margin and understand that these questions belong to a different group, helping them recognize the need to change their navigation. Therefore, I hypothesize that using indentation for the follow-up questions will decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to not using indentation (H2.2).

Sub-numbering the follow-up questions is different from both enclosure and indentation in that respondents need to read the question to see and process the question number. This means respondents must use attentive processing (stage four of visual processing) to process sub-numbering; it will not be picked up during pre-attentive processing. Respondents need to first learn how the questions are numbered throughout the questionnaire, and then see that the sub-numbering of the follow-up questions deviates from that pattern and thus they belong to a separate group. Although sub-numbering requires further processing compared to enclosure or indentation, it is still a visual grouping mechanism and one that can be considered common knowledge to respondents. Therefore, I hypothesize that using sub-numbering for the follow-up questions will decrease item nonresponse to the filter question, as well as rates of omission and commission errors on the follow-up questions compared to not using sub-numbering (H2.3).

In the forms with multiple visual elements, the elements build off and reinforce each other. As argued above, each element is processed by respondents during a different stage of visual processing: separate enclosure is processed in the first stage, indentation is processed in the second stage and sub-numbering is processed in the fourth stage. As such, respondents continually receive reinforcement while visually processing the skip pattern, and are primed to look for

other cues that can further assist in the navigation of the skip patterns.

With enclosure and indentation, respondents first see the contrast of the separate enclosure and then identify that the questions and this separate enclosure element are not at the left margin like previous questions. At this stage, respondents are using the combination of the contrast of the separate enclosure with top-down processing to further identify the separate grouping of the follow-up questions. Therefore, I hypothesize that the use of both enclosure and indentation will further decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to using only enclosure or indentation (H2.4).

Sub-numbering occurs later in visual processing and requires using attentive processing compared to enclosure and indentation. Combining sub-numbering with enclosure, indentation, or both provides cues to the respondent during both pre-attentive and attentive processing. This addition of elements at both levels of processing reinforces the separate grouping of the follow-up questions and further improves the effects of the individual elements. Therefore, I hypothesize that the use of both enclosure and sub-numbering (H2.5), indentation and sub-numbering (H2.6) and all three visual elements (enclosure, indentation, and sub-numbering—H2.7) will further decrease item nonresponse to the filter question as well as rates of omission and commission errors on the follow-up questions compared to using only enclosure, indentation, or sub-numbering.

2.3 **Methods**

The use of separate enclosure, indentation, and sub-numbering to try to reduce skip errors is examined using data from two experiments. The first experiment was implemented in an eight-page mail survey (labor survey) conducted by the Bureau

of Sociological Research at the University of Nebraska—Lincoln (UNL) for the Nebraska Department of Economic Development (NDED). The second experiment was embedded in a four-page mail survey (UNL survey) developed and fielded by the author primarily for the purpose of this research. The labor survey examined all three visual grouping elements while the UNL survey only examined enclosure and indentation due to funding constraints.

2.3.1 Experimental Treatments

In both experiments, the control treatment consists of the detection method from Redline and colleagues (2003) where there are bold instructions with an arrow leading to the next question to be answered as well as an "If yes" or "If no" cue at the beginning of the next question (Figure 2.3, Form 1 and Figure 2.4, Form 1). The other forms (seven for the labor survey and three for the UNL survey) incorporate enclosure, proximity, and similarity to examine the effectiveness of visually grouping the follow-up questions through these different means. Specifically, enclosure in skip patterns means that the follow-up items are located in a separate background area from the rest of the questions (Figure 2.3, Form 2 and Figure 2.4, Form 2). Proximity in skip patterns refers to a shift in the horizontal location of the follow-up questions on the page. The follow-up questions are indented while questions that everyone answers are left aligned (Figure 2.3, Form 3 and Figure 2.4, Form 3). Both the labor and UNL surveys examine these two visual design elements as well as the combination of these two visual design elements (Figure 2.5, Form 5 and Figure 2.4, Form 4).

The labor survey also examines the effect of subgrouping through similarity, which is established through question numbering. In particular, the follow-up questions have alpha-numeric sub-numbering (i.e., 2a, 2b, 2c, etc.) while the

questions everyone answers have normal continuous numbering (i.e., 1, 2, 3, etc. Figure 2.4, Form 4). In addition to these forms, the labor survey fully crosses sub-numbering with enclosure and indentation (Figure 2.5, Forms 6, 7, and 8).

In all cases, visual design features are used to create stronger sub-grouping within the skip pattern. The intent is that those questions with the different visual element(s) (i.e., the follow-up questions) will be perceived as part of a group and different from questions without the visual element(s) (i.e., the filter questions and subsequent questions everyone answers). Using these visual elements is an attempt to help respondents understand that the follow-up questions belong to a separate group from the filter question and should only be answered if respondents meet certain criteria.

2.3.2 Labor Survey

The Labor Survey was designed to understand the labor market in Northeastern Nebraska. The questionnaire included ten skip patterns (including nested skip patterns) and was sent to a sample of 12,000 households located in Northeastern Nebraska and the Sioux City area of Iowa and South Dakota. These households were randomly selected from the USPS Computerized Delivery Sequence File (CDSF). The next birthday method (Gaziano, 2005) was used to select a member of each household to complete the survey. Additionally, to increase response rates, this study used the Tailored Design Method (Dillman et al., 2014) with five mailings: a pre-notice, an initial questionnaire mailing, a follow-up postcard, and two follow-up mailings with replacement questionnaires sent to non-respondents. The labor survey was fielded from October through December 2013.

Sample members were randomly assigned to one of the eight experimental treatments (see Figures 2.3 and 2.5 for an example skip pattern in each treatment;

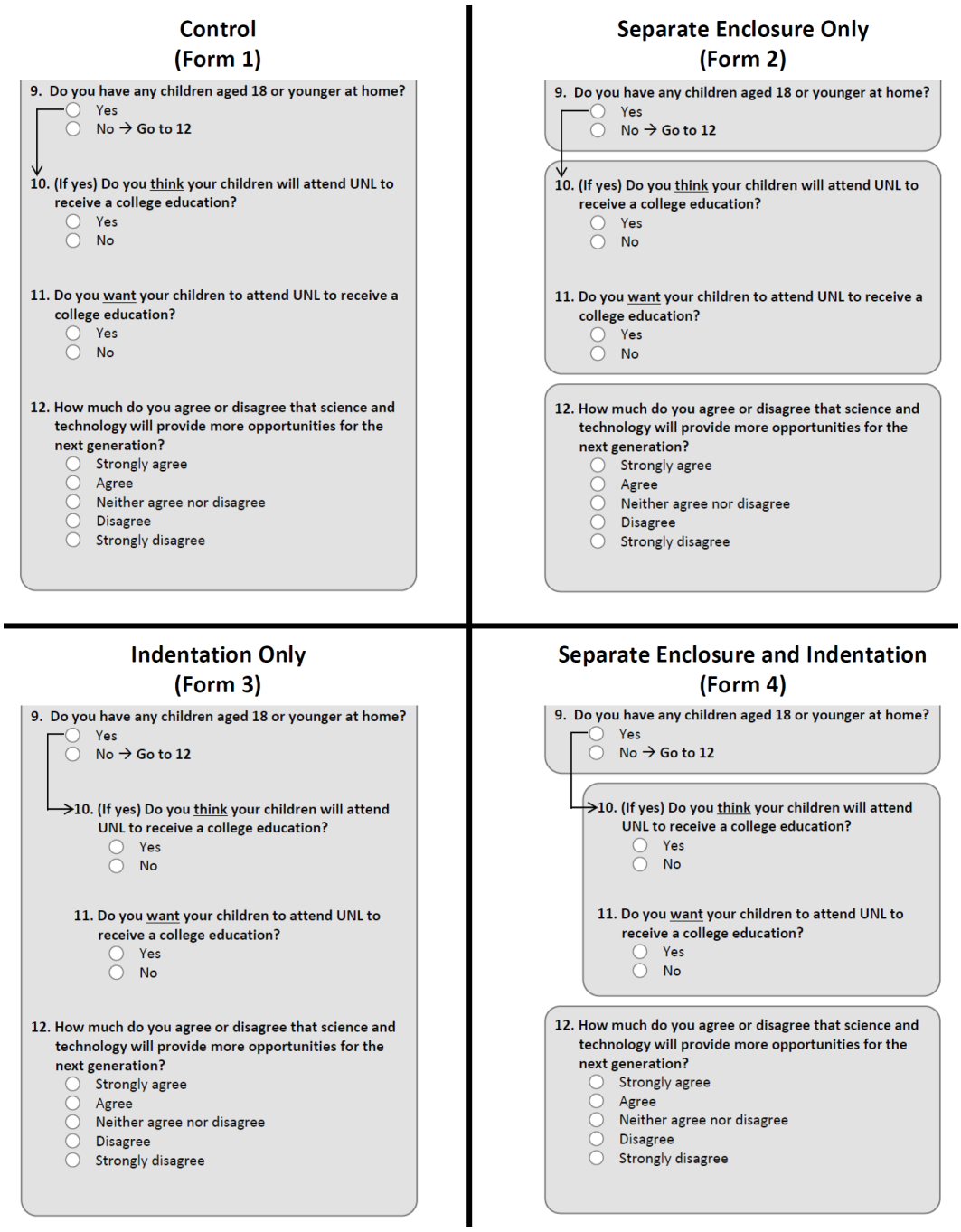

Figure 2.4: Example of a Skip Pattern with Grouping Principles for Each Experimental Treatment in the UNL Survey

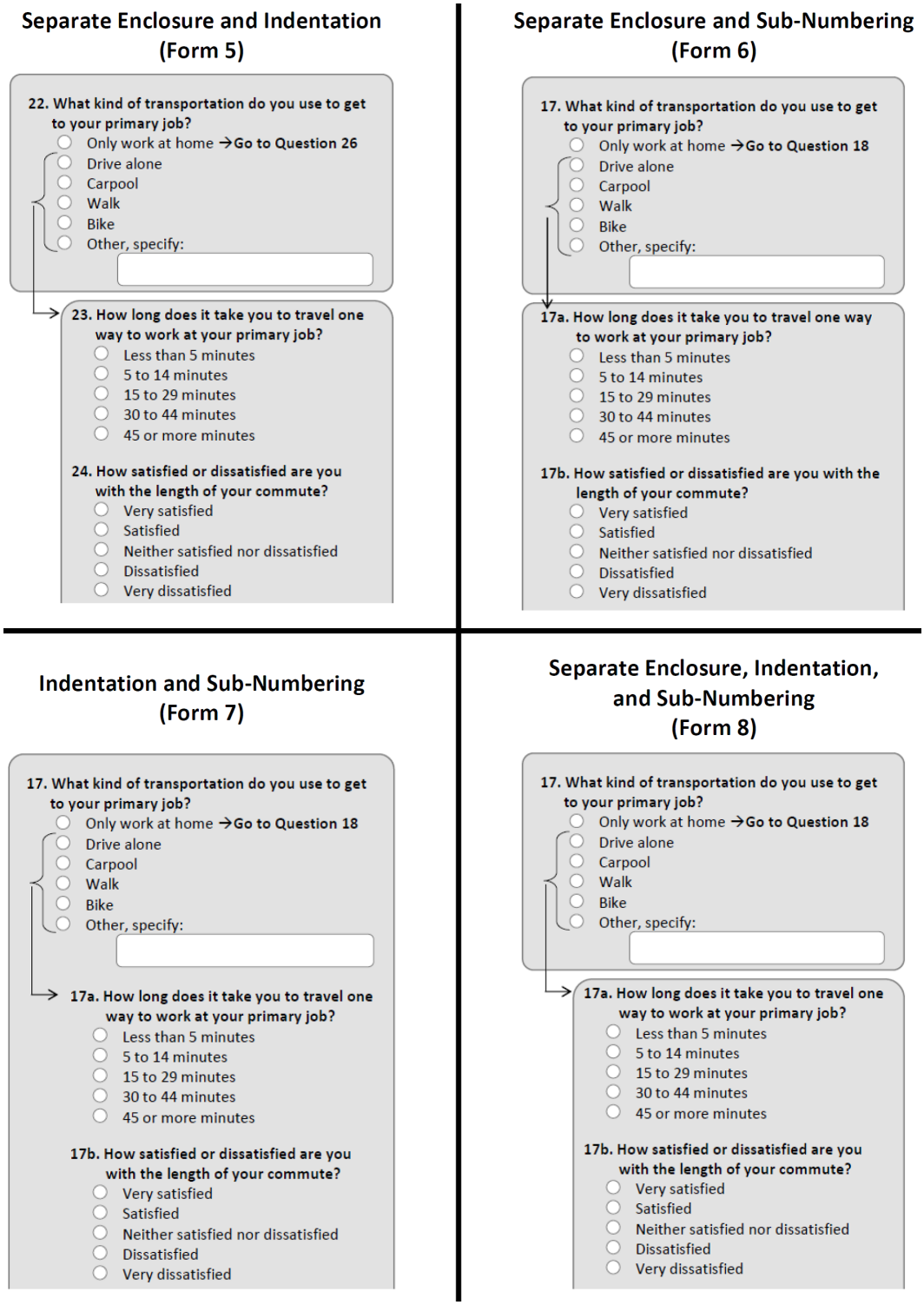

Figure 2.5: Example of skip pattern with single grouping elements for the labor survey

see Appendices B-I for the full questionnaires for the labor survey) in which the content of the questionnaire was held constant but the design of skip pattern was altered. Each experimental treatment was sent to 1,500 households. Response rates (AAPOR RR1) by treatment ranged from 24.8% to 28.1% and do not significantly differ across treatments (χ^2=6.46, p=0.49; Table 2.1).

Table 2.1: Number of Respondents and Response Rates by Experimental Treatment for the Labor Survey

Treatment	**Assigned Sample Size**	**Number of Respondents**	**AAPOR RR1**
Control	1500	391	26.1%
Enclosure Only	1500	389	25.9%
Indentation Only	1500	418	27.9%
Sub-Numbering Only	1500	394	26.3%
Enclosure and Indentation	1500	372	24.8%
Enclosure and Sub-Numbering	1500	398	26.5%
Indentation and Sub-Numbering	1500	422	28.1%
Enclosure, Indentation and Sub-Numbering	1500	383	25.5%
Total	12 000	3167	26.4%
			$\chi^2 = 6.46$, p = 0.49

2.3.3 UNL Survey

The second experiment (UNL survey) was fielded July through October 2014 (after the labor survey). This study was funded with a Doctoral Dissertation Research Improvement Grant (DDRIG) from the NSF (SES-1357554) with a sample of 3,000 Nebraska residents. The households were drawn from the USPS Computerized Delivery Sequence File (CDSF) using a stratified simple random sample with proportionate allocation. There were two strata one for respondents living in a

county in southeast Nebraska near UNL[4] and another for respondents living in the rest of the state. The next birthday method was used to select a member of each household to complete the survey (Gaziano, 2005).

To encourage response, the UNL survey was designed to take advantage of the study's affiliation with the University of Nebraska—Lincoln (UNL). The four-page questionnaire asked respondents about UNL and its connection to the community through events and research. Additionally, this survey was implemented using the Tailored Design Method (Dillman et al., 2014) with four mailings: an initial invitation, a follow-up postcard, and two follow-up mailings, each with a replacement questionnaire sent to non-respondents. Due to low response rates after the first follow-up mailing, the final follow-up mailing included a $1 incentive to increase response rates and therefore, power for the analyses.

Each sample household was randomly assigned to one of four experimental treatments (see Figure 2.4 for an example skip pattern in each treatment; see Appendices J-M for the full questionnaires for the UNL survey), resulting in a sample size of 750 per experimental treatment. Response rates (AAPOR RR1) by treatment ranged from 35.6% to 36.4%, resulting in 267 to 273 respondents per treatment. The response rates do not significantly differ across all treatments (χ^2=0.12, p=0.99; see Table 2.2).

2.3.4 Operationalization of Outcomes

As previously mentioned, three types of error are examined in this chapter: item nonresponse to the filter question, omission errors, and commission errors. To

[4]The counties located in southeast Nebraska near UNL are Butler, Cass, Dodge, Douglas, Fillmore, Gage, Jefferson, Johnson, Lancaster, Nemaha, Otoe, Pawnee, Polk, Richardson, Saline, Sarpy, Saunders, Seward, Thayer, Washington, and York.

Table 2.2: Number of Respondents and Response Rates by Experimental Treatment for the UNL Survey

Treatment	**Assigned Sample Size**	**Number of Respondents**	**AAPOR RR1**
Control	750	270	36.0%
Enclosure Only	750	272	36.3%
Indentation Only	750	267	35.6%
Enclosure and Indentation	750	273	36.4%
Total	3000	1082	36.1%
			$\chi^2 = 0.12$, p = 0.99

measure these error types, two indicator variables are created based on how respondents answered each question in each skip pattern in each survey. The first variable is binomial, capturing whether respondents failed to answer the filter question (1) or answered the filter question (0). The second variable is a multinomial variable indicating if the respondent had omission errors on the follow-up questions (1), had commission errors on the follow-up questions (2), or had no errors on the follow-up questions (0). Both indicator variables can take on a missing value if the respondent was not eligible to commit an error for that skip pattern. For example, if a skip pattern is nested within another skip pattern, respondents screened out of answering the follow-up questions would not be eligible to commit an error on the nested skip pattern and therefore are assigned a missing value for both indicator variables. Additionally, respondents who had item nonresponse on the filter question were assigned a missing value for the omission-commission variable as it was not possible to determine if the respondent had committed an error or not on the follow-up questions.

Because the surveys have multiple skip patterns, the data is structured in a "long" or "nested" structure. In a long format dataset, the data for each respondent is kept in multiple rows where each row represents a skip pattern within

the respondent. For example, in the labor survey there are ten skip patterns, so each respondent has ten rows of data. This type of structure allows me to calculate the overall proportion of skip patterns in which each type of error was made by dividing the counts of errors by all eligible skip patterns in each survey.

2.3.5 Analysis Methods

To test of the effectiveness of visually grouping skip patterns, I analyze the data in two ways. First, I look at the overall proportion of skip patterns in which each type of error was made, testing for significant differences across treatments using chi-square tests for homogeneity. This bivariate analysis allows me to understand if there are overall differences throughout the survey. I can use the proportions of each error to see if respondents had higher percentages of errors in any one treatment over all opportunities (i.e., skip patterns). To calculate the proportions, I divide the total number of occurrences of the error type by the total number of opportunities across all respondents for each treatment,

$$p_t = \frac{\sum_{j=1}^{n_t} \sum_{i=1}^{s} error_{ij}}{n_t * s} \tag{2.1}$$

where p_t is the proportion of errors for treatment t, $error_{ij}$ is the indicator of whether respondent j made a skip error on skip pattern i, n_t is the total number of respondents in treatment t, and s is the total number of skip pattern occurrences. The proportions are calculated for each type of error for each treatment in each survey. Thus, there are 8 proportions calculated for each type of error in the labor survey and 4 in the UNL survey. Additionally, I use the Tukey multiple comparison method to statistically compare the error rates of each treatment to the control.

For the second analysis, I delve further into these error sources by switching from a bivariate analysis to a multilevel multivariate regression model which accounts for the respondent level variance. To do this, I use a multilevel model where a respondent's answers are nested within each respondent. The two models used in this analysis are below in equations 2.2 and 2.3. Equation 2.2 is a multilevel logistic regression model to determine the probability respondents will have item nonresponse on the filter question,

$$\begin{aligned} logit(Error_{ij}) = u_j + \alpha + \beta_1 Enclosure_j \\ + \beta_2 Indentation_j + \beta_3 SubNumbering_j \\ \\ + \beta_4 Enclosure_j Indentation_j \\ + \beta_5 Enclosure_j SubNumbering_j \\ + \beta_6 Indentation_j SubNumbering_j \\ + \beta_7 Enclosure_j Indentation_j SubNumbering_j \\ + \varepsilon_{ij} \end{aligned} \tag{2.2}$$

where, i represents the skip pattern, j represents the respondent, $Error_{ij}$ is an indicator of whether respondent j had item nonresponse for skip pattern i, u_j is the random intercept coefficient for respondent j, $Enclosure_{ij}$ is an indicator of whether the form respondent j was assigned contained separate enclosure, $Indentation_{ij}$ is an indicator of whether the form respondent j was assigned contained indentation, and $SubNumbering_{ij}$ is an indicator of whether the form respondent j was assigned contained sub-numbering.

Equation 2.3 is a multilevel multinomial regression model to determine the probability respondents will have omission or commission errors on the follow-up questions[5],

[5]For space reasons I have only included the models with all three visual design elements. The analysis of the labor survey will use these models, while the analysis of the UNL survey will only

$$
\begin{aligned}
logit(Error_{ijk}) = {} & u_{jk} + \alpha_k + \beta_{1k} Enclosure_j \\
& + \beta_{2k} Indentation_j + \beta_{3k} SubNumbering_j \\
& \\
& + \beta_{4k} Enclosure_j Indentation_j \\
& + \beta_{5k} Enclosure_j SubNumbering_j \\
& + \beta_{6k} Indentation_j SubNumbering_j \\
& + \beta_{7k} Enclosure_j Indentation_j SubNumbering_j \\
& + \varepsilon_{ijk}
\end{aligned}
\tag{2.3}
$$

where, i represents the skip pattern, j represents the respondent, k represents the error type (omission, commission, no error), $Error_{ijk}$ is an indicator of whether respondent j had error k for skip pattern i, u_{jk} is the random intercept coefficient for respondent j and error k, α_k is the coefficient for error k, β_k's are the coefficients for each error k, $Enclosure_{ij}$ is an indicator of whether the form respondent j was assigned contained separate enclosure, $Indentation_{ij}$ is an indicator of whether the form respondent j was assigned contained indentation, and $SubNumbering_{ij}$ is an indicator of whether the form respondent j was assigned contained sub-numbering.

In each of these models, I first examine the main effects then add in the second order interactions and finally the third order interaction for the labor survey. By building the models in this manner I can gain insight into both the main effects of the visual grouping elements as well as the combinations of them. These models are analyzed and built separately for the UNL and labor surveys resulting in 10 models.

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include enclosure, indentation, and the interaction between the two.

2.4 **Results**

2.4.1 Item Nonresponse on the Filter Question

Analysis 1: Overall Effects

The percent of skip patterns where there was item nonresponse to the filter question for each visual design element regardless of if the other elements were present is in Table 2.3. Overall, we see that respondents failed to answer the filter question in 4.9% of the skip patterns for the labor survey and in 1.2% of skip patterns in the UNL survey. Respondents who had a form with sub-numbering in the labor survey had significantly higher rates of item nonresponse to the filter question (5.5%) compared to the control form with no elements added (4.3%). In the UNL survey, respondents with a form with either enclosure or indentation had significantly lower rates of item nonresponse to the filter question (both 0.9%) compared to the control form with no elements added (1.6%).

Table 2.3: Percent of skip patterns where respondents had item nonresponse errors to the filter question for the Labor and UNL surveys across visual design elements

Visual Design Element	**Labor Survey**	**UNL Survey**
Control Form: No Added Elements	4.3%	1.6%
Enclosure	5.0%	0.9%*
Indentation	4.7%	0.9%*
Sub-Numbering	5.5%*	—
Total	**4.9%**	**1.2%**
	$\chi^2 = 9.83$	$\chi^2 = 6.74$
	$p = 0.02$	$p = 0.03$

Significant differences from the control treatment for $p < 0.05$ is denoted by *.

Table 2.4 expands this and looks at the rates of item nonresponse to the filter question for all combinations of elements. We see that the percent of skip patterns where respondents failed to answer the filter question in the labor survey ranged from 4.0% for respondents who had the enclosure and indentation form to 5.7% for respondents who had the enclosure and sub-numbering form. For the UNL survey, the percent of skip patterns where respondents failed to answer the filter question ranged from 0.6% for respondents who had the enclosure and indentation form to 1.6% for respondents who had the control form. Looking at pairwise comparisons using Tukey's multiple comparison methods, the item nonresponse rates on the filter questions for the experimental treatments do not significantly differ from the control for the labor survey. However, the enclosure and indentation form has significantly lower item nonresponse rates on the filter question compared to the control for the UNL survey.

Table 2.4: Percent of skip patterns where respondents had item nonresponse errors to the filter question for both surveys across all experimental treatments

Visual Design Element	**Labor Survey**	**UNL Survey**
Control Form: No Added Elements	4.3%	1.6%
Enclosure Only	4.6%	1.2%
Indentation Only	4.1%	1.3%
Sub-Numbering	5.3%	—
Enclosure * Indentation	4.0%	0.6%*
Enclosure * Sub-Numbering	5.7%	—
Indentation * Sub-Numbering	5.5%	—
Enclosure * Indentation * Sub-Numbering	5.4%	—
Total	**4.9%**	**1.2%**
	$\chi^2 = 20.59$	$\chi^2 = 8.81$
	$p = 0.004$	$p = 0.03$

Significant differences from the control treatment for $p < 0.05$ is denoted by *.

Analysis 2: Multivariate Analysis

Next, I look at item nonresponse rates on the filter question in more depth by examining the multilevel logistic model defined in Equation 2.2. This model examines the probability that respondents failed to answer the filter question at each opportunity (i.e., skip pattern). First, I look at the multilevel logistic model for the main effects only (labor survey: Table 2.5; UNL survey: Table 2.6). In the labor survey, the odds that respondents with a sub-numbering form fail to answer a filter question was 1.48 times that of respondents with the control form. That is, the inclusion of sub-numbering resulted in a higher probability that respondents have item nonresponse to the filter question in the labor survey (opposite hypothesis H2.3). Also contrary to hypotheses (H2.1 and H2.2) neither enclosure nor indentation had a significant effect on the probability of having item nonresponse on the filter question in either survey.

Looking at the two-way and three-way interaction models, we see that none of the interaction terms are statistically significant for either the labor survey or the UNL survey. This means that combinations of these visual design elements do not decrease item nonresponse to the filter question further compared to the main effects (hypotheses H2.4 through H2.7).

Table 2.5: Odds ratios for the multilevel logistic regression predicting the probability respondents have item nonresponse to the filter question for Labor survey

Parameter	**Main Effects**		**2-way Interactions**		**3-way Interaction**	
Intercept	0.015*	(0.011, 0.019)	0.014*	(0.010, 0.019)	0.014*	(0.010, 0.020)
Enclosure	1.026	(0.842, 1.250)	1.124	(0.792, 1.596)	1.097	(0.729, 1.650)
Indentation	0.928	(0.762, 1.131)	0.974	(0.687, 1.381)	0.950	(0.633, 1.427)
Sub-Numbering	1.477*	(1.210, 1.802)	1.425*	(1.008, 2.013)	1.391	(0.933, 2.074)
Enclosure * Indentation			0.835	(0.562, 1.240)	0.878	(0.490, 1.573)
Enclosure * Sub-Numbering			0.996	(0.670, 1.481)	1.043	(0.597, 1.822)
Indentation * Sub-Numbering			1.078	(0.725, 1.603)	1.128	(0.648, 1.966)
Enclosure * Indentation * Sub-Numbering					0.910	(0.411, 2.013)
Respondent Variance	2.9743		2.9739		2.9748	
ICC	0.4748		0.4748		0.4749	
-2*Log-Likelihood	8312.16		8311.23		8311.17	
AIC	8322.16		8327.23		8329.17	

n = 22,934

Significance of $p < 0.05$ is denoted by *. Reference group is respondents who received the control form with no added visual design elements.

Table 2.6: Odds ratios for the multilevel logistic regression predicting the probability respondents have item nonresponse to filter question—UNL survey

Parameter	**Main Effects**		**2-way Interaction**	
Intercept	0.000*	(0.000, 0.001)	0.000*	(0.000, 0.001)
Enclosure	0.855	(0.334, 2.193)	0.982	(0.290, 3.319)
Indentation	0.616	(0.237, 1.605)	0.723	(0.197, 2.657)
Enclosure * Indentation			0.711	(0.104, 4.864)
Respondent Variance	30.5807		30.4746	
ICC	0.9029		0.9026	
-2*Log-Likelihood	921.44		921.32	
AIC	929.44		931.32	

n = 8,371

Significance of $p < 0.05$ is denoted by *. Reference group is respondents who received the control form with no added visual design elements.

Summary of Hypothesis and Findings for Item Nonresponse on the Filter

Based on these results, it appears that the visual grouping treatments have no reinforcing effects and only one main effect on the probability that respondents had item nonresponse to the filter question. Although these added elements do not improve rates of item nonresponse to the filter question, it is important to note that with the exception of sub-numbering, they do not increase the rates of error either. Table 2.7 summarizes the findings from the two analyses.

2.4.2 Omission and Commission Errors

Analysis 1: Overall Effects

The percent of skip patterns where there were omission or commission errors to the follow-up questions for each visual design element regardless of if the other elements were present is in Table 2.8. First looking at omission errors, we see that

Table 2.7: Summary of hypotheses about item nonresponse on the filter question

Experimental Treatment	Findings
Enclosure (H2.1)	n.s.
Indentation (H2.2)	n.s.
Sub-Numbering (H2.3)	↑
Enclosure and Indentation (H2.4)	n.s.
Enclosure and Sub-Numbering (H2.5)	n.s.
Indentation and Sub-Numbering (H2.6)	n.s.
Enclosure, Indentation and Sub-Numbering (H2.7)	n.s.

respondents had omission errors to the follow-up questions in 0.7% of the skip patterns in the labor survey and 2.4% of the skip patterns in the UNL survey. In the labor survey, there are no significant differences in omission error rates when the visual design elements are present compared to when they are not (control form), but in the UNL survey, forms with indentation had a significantly higher rate of skip patterns where omission errors occurred (3.0%) compared to forms with no added visual elements (1.9%).

Next looking at commission errors, we see that respondents had commission errors to the follow-up questions in 9.4% of the skip patterns in the labor survey and 2.5% of the skip patterns in the UNL survey. In the UNL survey, there are no significant differences in commission error rates when the visual design elements are present compared to when they are not (control form), but in the labor survey, respondents who had forms with enclosure had a lower rate of skip patterns where commission errors occurred (8.5%) than respondents in the control condition with no added visual elements (10.4%). These results indicate that enclosure reduces commission errors (support for hypothesis H2.1) and indentation increases omission errors (opposite hypothesis H2.2). These main effects do not indicate any significant differences for sub-numbering compared to the control condition

(hypothesis H2.3).

Table 2.8: Percent of skip patterns where respondents had omission or commission errors on the follow-up questions for both surveys across visual design elements

	Labor Survey		UNL Survey	
Visual Design Element	**Omission Errors**	**Commission Errors**	**Omission Errors**	**Commission Errors**
Control Form:				
No Added Elements	0.6%	10.4%	1.9%	2.2%
Enclosure	0.6%	8.5%*	2.1%	2.1%
Indentation	0.8%	9.2%	3.0%*	2.7%
Sub-Numbering	0.7%	9.4%	—	—
Total	**0.7**%	**9.4**%	**2.4**%	**2.5**%
	$\chi^2 = 3.23$	$\chi^2 = 11.03$	$\chi^2 = 9.95$	$\chi^2 = 3.39$
	p = 0.36	p = 0.01	p = 0.01	p = 0.18

Significant differences from the control treatment for $p < 0.05$ is denoted by *.

Table 2.9 expands this analysis to include the rate of omission and commission errors across the skip patterns for each experimental treatment. For omission errors, we see similar patterns across the two surveys. The enclosure only treatment had the lowest rate of omission errors (0.3% in the labor survey and 1.7% in the UNL survey) and the indentation only treatment had the highest rate of omission errors (0.8% in the labor survey—tied with two other forms—and 3.5% in the UNL survey). The differences between the experimental treatments and the control form reached significance in the UNL survey only. Moreover, pairwise comparisons revealed that omission error rates did not significantly differ between the combination treatments and the control treatment in either the Labor or the UNL survey.

Table 2.9: Percent of skip patterns where respondents had omission or commission errors on the follow-up questions for both surveys across all experimental treatments

	Labor Survey		UNL Survey	
Visual Design Element	**Omission Errors**	**Commission Errors**	**Omission Errors**	**Commission Errors**
Control Form:				
No Added Elements	0.6%	10.4%	1.9%	2.2%
Enclosure Only	0.3%	9.0%	1.7%	2.2%
Indentation Only	0.8%	10.3%	3.5%*	3.3%*
Sub-Numbering Only	0.8%	9.8%	—	—
Enclosure * Indentation	0.7%	8.0%*	2.5%	2.2%
Enclosure * Sub-Numbering	0.7%	9.3%	—	—
Indentation * Sub-Numbering	0.8%	10.6%	—	—
Enclosure * Indentation * Sub-Numbering	0.6%	7.8%*	—	—
Total	**0.7**%	**9.4**%	**2.4**%	**2.5**%
	$\chi^2 = 8.26$ p = 0.31	$\chi^2 = 26.53$ p < 0.001	$\chi^2 = 17.43$ p < 0.001	$\chi^2 = 9.20$ p = 0.03

Significant differences from the control treatment for $p < 0.05$ is denoted by *.

For commission errors of the individual forms, we see that the percent of skip patterns where respondents had commission errors on the follow-up questions in the labor survey ranged from 7.8% for respondents who had the form with all three grouping elements (enclosure, indentation, and sub-numbering) to 10.6% for respondents who had the sub-numbering and indentation form. For the UNL survey, the percent of skip patterns where respondents had commission errors on the follow-up questions ranged from 2.2% for respondents for all forms except the indentation only form to 3.3% for respondents who had the indentation only form.

Looking at the pairwise comparisons in the Labor survey, the enclosure and indentation form and the enclosure, indentation and sub-numbering form had statistically lower rates of commission errors than the control form. This means

that respondents in these treatment groups had fewer commission errors on the follow-up questions compared to respondents in the control form. However, this finding did not hold in the UNL survey; the difference in commission error rates between the enclosure and indentation form and the control form was not statistically significant in this survey.

These results indicate that there are some reinforcing effects for rates of commission errors but not for rates of omission errors. Specifically, the use of both enclosure and indentation (hypothesis H2.4) as well as enclosure, indentation and sub-numbering (hypothesis H2.7) reduced the rates of commission errors in the labor survey compared to the control form with no added visual design elements. Although the findings for the enclosure and indentation form were not replicated in the UNL survey, the use of both design features did not increase commission errors.

Analysis 2: Accounting for Multiple Skip Patterns

Next, I look at the omission and commission error rates more in depth by examining the multinomial model defined in Equation 2.3. This model examines the probability that respondents had omission or commission errors on the follow-up questions for each experimental treatment. First, I look at the multilevel multinomial logistic model for the main effects only (labor survey: Table 2.10; UNL survey: Table 2.12). Forms with enclosure decrease the odds of having commission errors on the follow-up questions compared to forms without enclosure in the labor survey. We also see that forms with indentation increase the odds of having omission errors on the follow-up questions compared to forms without indentation in the UNL survey. These were the only two significant coefficients in the models, but the trends are the same across the two surveys. Specifically, enclosure decreases omission and commission error rates (hypothesis H2.1) and indentation increases

omission and commission error rates (opposite of hypothesis H2.2). There are no significant coefficients for sub-numbering in the labor survey, leading to no support for hypothesis H2.3.

Table 2.10: Odds ratios for the multilevel multinomial logistic regression predicting the probability respondents have omission and commission errors on the follow-up questions for the Labor survey

Parameter	**Omission Errors**		**Commission Errors**	
Intercept	0.006*	(0.005, 0.009)	0.119*	(0.109, 0.130)
Enclosure	0.790	(0.563, 1.110)	0.810*	(0.739, 0.887)
Indentation	1.279	(0.912, 1.796)	0.950	(0.868, 1.041)
Sub-Numbering	1.179	(0.842, 1.652)	0.995	(0.908, 1.089)
Respondent Variance	1.0390		0.0000	
ICC	0.0000		0.0000	
-2*Log Pseudo-Likelihood	234547.4			

n = 21,812

Significance of $p < 0.05$ is denoted by *. Reference group is respondents who received the control form with no added visual design elements.

Table 2.11: Odds ratios for the multilevel multinomial logistic regression with interaction effects predicting the probability respondents have omission and commission errors on the follow-up questions for the Labor survey

	2-way Interactions		**3-way Interaction**	
Parameter	**Omission Errors**	**Commission Errors**	**Omission Errors**	**Commission Errors**
Intercept	0.006* (0.003, 0.009)	0.115* (0.102, 0.129)	0.006* (0.004, 0.010)	0.117* (0.103, 0.132)
Enclosure	0.751 (0.387, 1.460)	0.887 (0.758, 1.037)	0.596 (0.256, 1.385)	0.854 (0.713, 1.022)
Indentation	1.727 (0.955, 3.123)	1.029 (0.884, 1.197)	1.483 (0.761, 2.890)	0.994 (0.837, 1.180)
Sub-Numbering	1.570 (0.857, 2.874)	0.976 (0.835, 1.140)	1.333 (0.668, 2.663)	0.940 (0.787, 1.123)
Enclosure * Indentation	1.015 (0.509, 2.023)	0.816* (0.679, 0.980)	1.463 (0.512, 4.185)	0.882 (0.681, 1.143)
Enclosure * Sub-Numbering	1.076 (0.541, 2.139)	1.018 (0.847, 1.223)	1.567 (0.540, 4.552)	1.099 (0.851, 1.420)
Indentation * Sub-Numbering	0.573 (0.288, 1.141)	1.023 (0.853, 1.228)	0.759 (0.306, 1.884)	1.098 (0.860, 1.402)
Enclosure * Indentation * Sub-Numbering			0.520 (0.128, 2.110)	0.854 (0.592, 1.232)
Respondent Variance	1.0390	0.0000	1.0414	0.0000
ICC	0.2400	0.0000	0.2404	0.0000
-2*Log Pseudo-Likelihood	234854.4		234940.9	

n = 21,812

Significance of $p < 0.05$ is denoted by *. Reference group is respondents who received the control form with no added visual design elements.

Table 2.12: Odds ratios for the multilevel multinomial logistic regression predicting the probability respondents have omission and commission errors on the follow-up questions for the UNL survey

	Main Effects		**2-way Interaction**	
Parameter	**Omission Errors**	**Commission Errors**	**Omission Errors**	**Commission Errors**
Intercept	0.011* (0.007, 0.017)	0.008* (0.004, 0.013)	0.010* (0.006, 0.016)	0.007* (0.004, 0.012)
Enclosure	0.768 (0.545, 1.083)	0.739 (0.497, 1.099)	0.890 (0.523, 1.514)	0.959 (0.538, 1.707)
Indentation	1.689* (1.193, 2.391)	1.315 (0.884, 1.954)	1.900* (1.179, 3.062)	1.653 (0.958, 2.853)
Enclosure * Indentation			0.777 (0.387, 1.560)	0.613 (0.277, 1.356)
Respondent Variance	1.2729	1.7849	1.2721	1.7786
ICC	0.2790	0.3517	0.2788	0.3509
-2*Log-Likelihood	3662.59		3660.65	
AIC	3678.59		3680.65	

n = 8,325

Significance of $p < 0.05$ is denoted by *. Reference group is respondents who received the control form with no added visual design elements.

Next, I incorporate the interaction terms into the models by first adding the two-way interactions for both surveys and then adding the three-way interaction for the labor survey (Tables 2.11 and 2.12). Across both surveys, the only interaction that is significant is the interaction term for enclosure and indentation for commission errors in the labor survey (Table 2.11). Forms with both enclosure and indentation reduce the odds of having commission errors compared to either enclosure or indentation only (hypothesis H2.4). Figure 2.6 shows this interaction effect between enclosure and indentation for commission errors. Forms that have enclosure have lower rates of commission errors compared to forms without enclosure. However, when indentation is present, the effect is even greater.

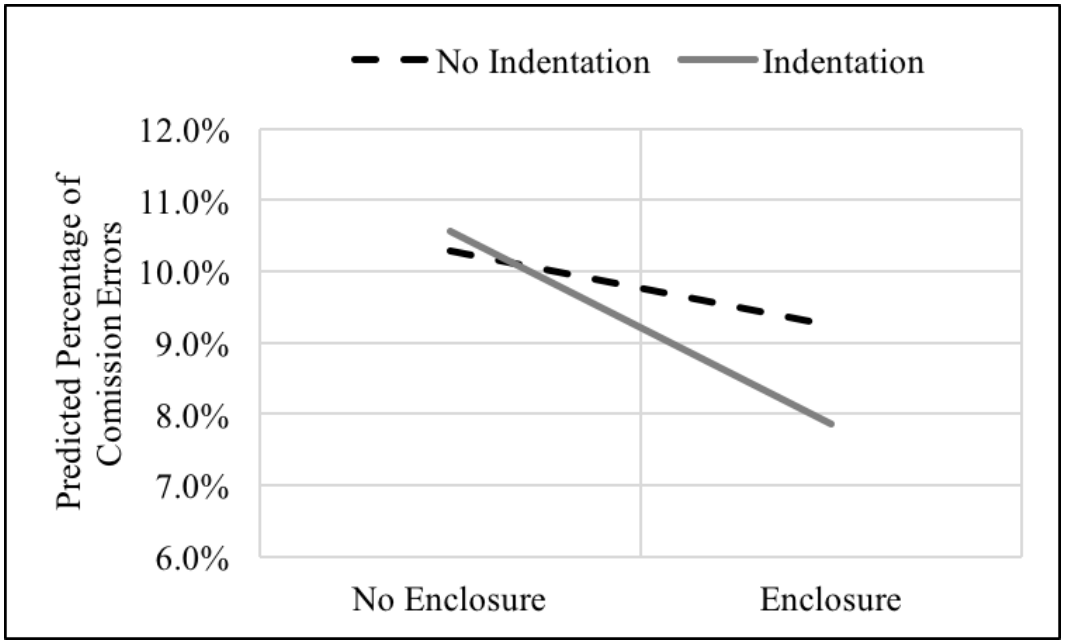


Figure 2.6: Predicted percentage of commission errors on the follow-up questions for forms with enclosure and indentation for the Labor survey

Summary of Hypothesis and Findings for Omission and Commission Errors

Based on these results, it appears that the visual grouping treatments have two

overall effects and one reinforcing effect on the probability that respondents had omission and commission errors on the follow-up questions. Enclosure on its own decreases commission errors, while indentation on its own increases omission errors. Additionally, when indentation is combined with enclosure, commission errors are significantly reduced. Sub-numbering only and in combination with other elements did not have a significant effect on omission or commission error rates. Table 2.13 summarizes the findings from the two analyses.

Table 2.13: Summary of Hypotheses about Omission and Commission Errors on the Follow-up Questions

	Findings	
Experimental Treatment	**Omission Errors**	**Commission Errors**
Enclosure (H2.1)	n.s.	↓
Indentation (H2.2)	↑	n.s.
Sub-Numbering (H2.3)	n.s.	n.s.
Enclosure and Indentation (H2.4)	n.s.	↓
Enclosure and Sub-Numbering (H2.5)	n.s.	n.s.
Indentation and Sub-Numbering (H2.6)	n.s.	n.s.
Enclosure, Indentation and Sub-Numbering (H2.7)	n.s.	n.s.

2.5 **Conclusions**

There are three key findings from these two studies. First, sub-numbering the follow-up items increased item nonresponse to the filter question but did not improve omission or commission error rates. When respondents do not answer the filter question, researchers do not know if the respondent correctly navigated the skip pattern, which may lead them to omit the data from the follow-up questions. This leads to reduced power for all questions in the skip pattern. Therefore, in general, it is not recommended to use sub-numbering in skip patterns. That said, it

is possible that respondents with different cognitive abilities use the sub-numbering differently, as it is most commonly noticed with reading the question text. The next chapter in this dissertation will examine the differences across respondent characteristics to determine if sub-numbering works better for respondents with high cognitive ability compared to respondents with low cognitive ability.

Second, using indentation significantly increases omission errors. Higher rates of omission errors lead to less usable data for skip patterns, and therefore a decrease in power for these questions. Unfortunately, this is opposite of what was hypothesized. One reason for this could be that indented questions are outside of the respondents' foveal view and therefore go unseen and unanswered.

The third key finding is that using enclosure or enclosure and indentation together significantly decreases commission errors with no detrimental effect on rates of item nonresponse to the filter question or omission errors. Because enclosure is seen during the first stage of the visual process, it is noticed and utilized without conscious analysis, thus it is an effective visual grouping method on its own. When combined with indentation, the visual contrast between the follow-up questions and all other questions is more prominent leading to further decreased commission errors compared to enclosure alone. Therefore, based on the results of this chapter, it is recommended that researchers use the combination of enclosure and indentation to reduce commission errors without increasing rates of omission errors or item nonresponse to the filter question.

There were some limitations to these surveys that should be examined in future studies. First, the labor survey was conducted for a client and therefore, the skip patterns were all behavioral filter questions with behavioral follow-ups and asked very specific questions about employment. However, the thought process respondents go through when answering behavioral questions is different from that

of attitudinal questions (Tourangeau et al., 2000). Additionally, the majority of the follow-up questions in the labor survey were open-ended. Previous research has found that respondents are less likely to answer open-ended questions (Dillman et al., 2014; Israel and Lamm, 2012; Millar and Dillman, 2012). Thus, the large amount of open-ended questions in the Labor survey likely increased the rate of omission errors. These limitations mean that the findings from the labor survey may not be generalizable to surveys with other types of questions or on other topics. This is particularly important for the findings for sub-numbering, as the UNL survey did not examine this visual grouping element. Second, the UNL survey had a smaller sample size, reducing the power for analyses. Therefore, the patterns found in the UNL survey may be indicative of significant differences in other surveys. As this is the first study to examine these visual grouping principles, more research is needed to gain more understanding about how these grouping principles help respondents.

A final note, it is possible that there are other ways to visually group the follow-up questions to help respondents better navigate. Additionally, there might be a specific sub-group of respondents where the visual design elements can further decrease skip errors. For example, a respondent who is not motivated may benefit more from the added visual elements compared to a more motivated respondent. The following two chapters of this dissertation analyze error rates based on respondent sub-groups to determine if any of these forms assist those with lower cognitive abilities as well as those who are less motivated.

Chapter 3: Effects of Visually Grouping Skip Patterns on Navigational Errors among Respondents with Different Levels of Cognitive Ability

3.1 Introduction

Researchers have found that older, lower educated, and less literate respondents have more difficulty undertaking complex survey tasks (Knauper, 1999; Knauper et al., 2007; Narayan and Krosnick, 1996; Krosnick et al., 1996; Al-Tayyib et al., 2002). These respondents either do not have sufficient working memory capacity to hold all necessary information or are unfamiliar with surveys and, therefore, are unable to navigate and complete complex survey tasks (Krosnick, 1991). This inability is important because not all questions asked are relevant to all respondents.

In interviewer-administered surveys, the burden for navigating past questions that are not applicable falls on the interviewer. In mail surveys, however, respondents need to navigate these questions on their own. Researchers use skip patterns to help respondents; however, since older, lower educated, and less literate respondents may not have the ability or familiarity to successfully navigate the skip patterns, they could be more likely to commit one of three main types of errors: item nonresponse to the filter question, errors of omission, or errors of commission (Redline et al., 2003). Occurrence of these errors could result in large amounts of missing data for lower cognitive ability subgroups which not only is a loss of important information, but high rates of missing data can undermine the statistical power needed for analyses, especially for analyses of respondent subgroups.

Previous research on skip patterns has found that visually grouping the follow-up questions with a separate background and indentation can reduce skip

errors overall (see Chapter 2). This chapter expands on this finding by examining the effect of the visual design elements for respondents with different levels of cognitive ability. Each visual design element tested is intended to create stronger grouping and subgrouping among items within skip patterns, making the navigational path through them clearer and decreasing skip errors for respondents who have difficulty with the written instructions. The effectiveness of each design for respondents with differing levels of cognitive ability is assessed by examining rates of errors of omission and commission, as well as item nonresponse on the filter question.

3.2 **Background**

3.2.1 Respondent Cognitive Ability in Survey Research

Research has shown that respondents with lower cognitive abilities have more difficulty completing complex survey tasks than respondents with higher cognitive abilities (Knauper, 1999; Narayan and Krosnick, 1996; Al-Tayyib et al., 2002; Smyth et al., 2011). Although cognitive ability cannot be measured directly, researchers have used age education, and literacy as proxies for cognitive ability (Knauper, 1999; Narayan and Krosnick, 1996; Olson et al., 2011). Specifically, they argue that older respondents, respondents with lower education levels, and lower literacy respondents may have difficulty navigating skip patterns especially when there are written navigation instructions. Therefore, visual design elements alongside verbal language could lower survey errors for respondents who have difficulty understanding the written survey instructions alone.

This idea coincides with theories from cognitive psychologists, who believe that an individual's intelligence is not defined solely by their literacy and ability to think analytically, but rather defined as a combination of multiple types of

intelligence (Gardner, 1983; Sternberg, 1985; Carroll, 1993). Although each theory of intelligence is a bit different, they all incorporate a spatial component as well as a more traditional linguistic component. In a study of college students, Mayer and Massa (2003) found that spatial ability is uncorrelated with scores on SAT and vocabulary tests. The findings from this study support the multiple intelligence theories that linguistic ability and spatial ability are two distinct areas of cognitive ability and individuals do not need to rely on literacy or other intelligences to follow spatial cues. Therefore, appealing to respondents' spatial abilities by providing visual cues could be used in surveys to assist respondents who may not have strong linguistic abilities. Additionally, this indicates that the measures of age, education, and literacy are proxies of linguistic ability and not cognitive ability as a whole.

The limited research in the survey field shows that using spatial cues such as visual design elements can help respondents with lower linguistic abilities achieve better quality data. Specifically, Stern and colleagues (2007) tested a variety of visual design features commonly used in surveys and found that some demographic groups responded to the visual design features different than others. For example, respondents in all demographic groups entered more words when presented with a large answer space for open-ended questions compared to a small answer space. However, the difference in the mean number of words was greater (5.39 words on average) for respondents with less than a college degree and compared to respondents with higher education (0.29 words on average). They also found other visual design features that had the same effect for all demographic groups, such as there were no differences across age or education levels in the probability of selecting items in a forced-choice compared to check all that apply formatted question. They argue that more research is needed to understand these effects

because while the effects are in the same direction for many demographic groups, the magnitude of the effect differs across the groups.

3.2.2 Visual Design in Survey Research

By using multiple types of visual elements, researchers can increase the chance that respondents see the elements at multiple stages of visual processing which can assist those respondents with different levels of spatial and linguistic ability. Spatial elements on the page such as the size and shape of elements are processed during pre-attentive processing (when respondents first see the survey), while linguistic elements such as text or numbers are processed later (during attentive processing—Ware, 2012). Therefore, survey designers can use different shapes or colors that will be noticed and processed during pre-attentive processing, benefiting respondents with higher levels of spatial ability, in combination with text or numbers that will be noticed and processed during attentive processing, benefiting respondents with higher levels of linguistic ability. Christian and Dillman (2004) group these elements into four main types of visual languages: graphical, symbolic, verbal and numerical.

Within the survey context, graphical language refers to the appearance of the questions on the paper (for example, spacing of questions and response options, any use of images, or font size). Symbolic language refers to the use of symbols throughout the questionnaire (for example, arrows). Verbal language is the actual words of the questions or instructions. Numerical language refers to numbers on the page such as the numbering of questions or response options. Additionally, graphical and symbolic languages by definition are spatial elements and are typically identified during the early pre-attentive stages of processing, while verbal and numerical languages are typically identified during the later attentive

processing stages (Ware, 2012).

Researchers can use the combination of graphical and verbal language elements to communicate skip instructions at multiple stages of the visual process, which may assist respondents with different levels of linguistic and spatial ability. However, it is important not to use too many elements. Ware (2012) states that using multiple visual elements can create clutter and cause confusion as there may be too many elements to process and respondents do not know where to start. Studies have found that respondents can only hold three or four visual elements in their working memory (Ware, 2012; Mack and Rock, 1998). If there are more than three or four elements present, respondents may not notice all of them. Additionally, if one visual element is stronger than the other elements, respondents may only notice and be attentive to that strong element, ignoring all others (Bartram and Ware, 2002).

3.2.3 Effects of Visual Elements in Skip Patterns

Gohring and Smyth (2013) tested adding three visual design elements to skip patterns. First, they flipped the response options in the filter question, so that the response options that lead into the follow-up questions are on the bottom. Second, they indented the follow-up questions to create a distinct visual grouping for the follow-up questions. Third, they changed the arrow leading from the response options into the follow-up questions from the left side of the response options to the right (see Figure 3.1). Contrary to the study by Stern and colleagues (2007), Gohring and Smyth found no differences across demographic groups. However, they introduced three design changes without testing each individually. It is impossible to tell if the lack of significant differences across demographic groups was due to no effect from all three visual design elements, due to one visual element (for example,

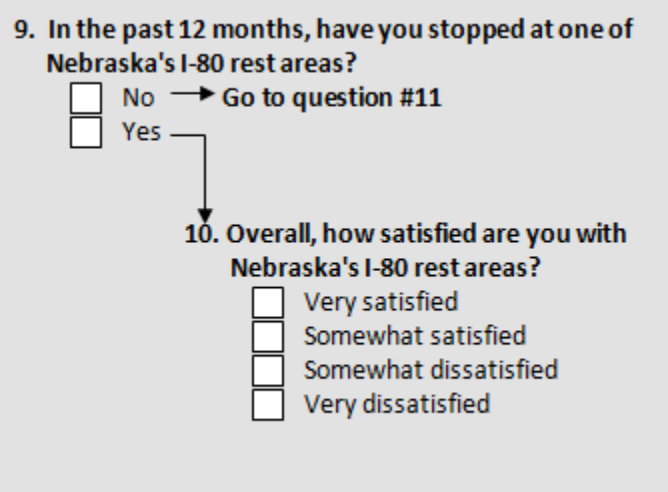


Figure 3.1: Example of a skip pattern from Gohring and Smyth (2013)

indentation) dominating, or due to a combination of positive and negative effects. For example, flipping the response options could have a negative impact for respondents with low cognitive ability (i.e., increase skip errors), while indentation of the follow-up questions could have a positive impact (i.e., decrease skip errors) for these same respondents. Results would show no effect because they were unable to differentiate the individual effects.

Smyth and colleagues (2011) looked at the effect of adding visual design elements to skip patterns on skip errors for low-literacy respondents. They found that indenting the follow-up questions and adding arrows had no effect on the skip error rate. However, like the Gohring and Smyth (2013) study, they tested multiple design changes at once. Therefore, more research is needed, as it is possible that using other visual design elements intended to appeal to a respondent's spatial ability in combination with written instructions will assist respondents with low linguistic ability.

This chapter expands on this research to examine differences in skip pattern error rates across respondents with different levels of linguistic ability by visually

grouping the follow-up questions using principles from visual processing theory and the Gestalt laws of pattern perception. Chapter 2 of this dissertation looked at the overall effects of this visual grouping. Out of the eight forms tested using common region (enclosure), proximity (indentation), and similarity (numbering) (see Figures 2.3 and 2.5 in Chapter 2), I found that using sub-numbering only increases rates of item nonresponse to the filter questions and using indentation only increases omission error rates, while enclosure or enclosure and indentation decreases commission error rates. One possible reason for the limited overall effects could be due to differential effects on skip pattern error rates for different subgroups of respondents. Specifically, low linguistic ability respondents could be benefiting from the added visual design elements but the overall effects are reduced due to consistent error rates of high linguistic ability respondents. I test this possibility in this chapter.

3.2.4 Hypotheses

I developed a set of hypotheses for how the rates of skip pattern errors differ for respondents with low and high levels of linguistic ability, both overall, and when the visual grouping principles of common region, proximity, and similarity are present. Overall, previous research shows that respondents with low linguistic abilities have higher errors rates on complex survey tasks compared to respondents with high linguistic abilities (Knauper, 1999; Narayan and Krosnick, 1996; Al-Tayyib et al., 2002). As skip patterns can be considered a complex survey task, I hypothesize that respondents with lower linguistic abilities will have more skip errors across all treatments than their counterparts with higher linguistic abilities (H3.1).

Although respondents with low linguistic abilities are hypothesized to have

higher error rates overall, the inclusion of visual design elements could decrease the rates of error for these respondents. Specifically, using separate enclosure and indentation can help respondents with lower linguistic abilities because these visual elements are spatially related. This means that respondents notice them during the pre-attentive stage of visual processing and they do not need to rely on attentive processing and linguistic ability to comprehend the instructions (Gardner, 1983; Carroll, 1993; Ware, 2012). Respondents with high linguistic ability, on the other hand, already have low error rates because they utilize the existing written instructions and symbols. This means that while high linguistic ability respondents may see and utilize the added visual design elements, we do not expect to see a large decrease in error rates for these respondents compared to the lower linguistic ability respondents. Therefore, I hypothesize that using separate enclosure (H3.2) or indentation (H3.3) for the follow-up questions will reduce skip errors further for respondents with low linguistic abilities compared to respondents with high linguistic abilities.

Sub-numbering on the other hand is processed during attentive processing and utilizes a respondent's linguistic ability instead of spatial ability (Gardner, 1983; Ware, 2012). Therefore, respondents with low linguistic ability may have more difficulty analyzing the sub-numbering than respondents with high linguistic ability. As a result, I hypothesize that using sub-numbering for the follow-up questions will reduce skip errors further for respondents with high linguistic abilities compared to respondents with low linguistic abilities (H3.4).

When looking at the combination form of enclosure and indentation, the multiple visual elements will build off each other and create even larger effects for respondents. Enclosure is identified during the first stage of visual processing and indentation is identified during the second stage of visual processing. The

continuing reinforcement of these cues during pre-attentive processing will further assist respondents. In particular, these cues will be identified subconsciously and are using the spatial ability of respondents instead of their linguistic ability. As a result, I hypothesize that the combination form of enclosure and indentation will decrease skip errors further for respondents with low linguistic abilities compared to respondents with high linguistic abilities (H3.5).

The combination forms of enclosure and sub-numbering, indentation and sub-numbering, and enclosure, indentation and sub-numbering each include visual design elements that are hypothesized to have opposite effects (enclosure and indentation assist low linguistic ability respondents further while sub-numbering assists high linguistic ability respondents further). Because of these counteracting elements and the fact that the coefficients of the combinations of these visual design elements were not statistically significant in the overall models (see Chapter 2), I do not hypothesize any differential effects on the skip pattern error rates for combination forms featuring sub-numbering across low and high linguistic ability respondents.

3.3 **Methods**

The use of enclosure, proximity, and similarity to try to improve skip instructions for respondents with varying levels of linguistic ability is examined using data from two experiments. The first experiment was implemented in an eight-page mail survey (labor survey) conducted by the Bureau of Sociological Research at the University of Nebraska—Lincoln (UNL) for the Nebraska Department of Economic Development (NDED). The second experiment was embedded in a four-page mail survey (UNL survey) developed and fielded by the author primarily for the purpose of this research. Both surveys captured the age and education of respondents but

literacy was only measured in the UNL survey due to client restrictions in the labor survey.[1]

Both experiments contain a control treatment featuring the detection method from Redline and colleagues (2003) which they found to be the most effective method in reducing skip pattern errors (Figures 2.3 and 2.4, Form 1 in Chapter 2). The other forms (seven for the labor survey and three for the UNL survey) incorporate enclosure, proximity, and similarity to examine the effectiveness of visually grouping the follow-up questions through these different principles. Both the labor and UNL surveys examine the enclosure and proximity principles by testing grouping the follow-up questions through separate background area (enclosure), indentation (proximity) and the combination of these two (Figures 2.3 and 2.4, Forms 2 and 3; Figure 2.4, Form 4; Figure 2.5, Form 5 in Chapter 2). The labor survey also examines the effects of subgrouping through the use of sub-numbering (similarity) both singularly and in combination with the other elements (Figures 2.3 and 2.5, Forms 4, 6, 7, and 8 in Chapter 2).

In all cases, visual design features are used to create stronger sub-grouping within the skip pattern. The intent is that those questions with the different visual element(s) (i.e., the follow-up questions) will be perceived as part of a group and different from questions without the visual element(s) (i.e., the filter questions and subsequent questions everyone answers). Using these elements may help respondents understand that the follow-up questions belong to a separate group from the filter question and should only be answered if respondents meet certain criteria.

[1]More information about the UNL and labor surveys can be found in Chapters 1 and 2 of this dissertation.

3.3.1 Labor Survey

Sample members from Northeastern Nebraska were randomly selected and assigned to one of the eight experimental treatments (see Appendices B-I for the full questionnaires for the labor survey) in which the content of the questionnaire was held constant but the design of skip instructions was altered. With a sample size of 12,000, each of the eight experimental treatments was sent to 1,500 households. Response rates (AAPOR RR1) by experimental treatment ranged from 24.8% to 28.1% and do not significantly differ across treatments (χ^2=6.46, p=0.49; see Table 2.1 in Chapter 2). Additionally, respondent characteristics (age and education) do not differ across each of the treatments (Table 3.1).

3.3.2 UNL Survey

The UNL survey had a sample size of 3,000 respondents from across the entire state of Nebraska. The households were drawn from the USPS Computerized Delivery Sequence File (CDSF) using a stratified simple random sample with proportionate allocation. There were two strata, one for respondents living in southeast Nebraska near UNL[2] and another for respondents living in the rest of the state. Each sample household was randomly assigned to one of four experimental forms (see Appendices J-M for the full questionnaires for the UNL survey), resulting in a sample size of 750 per treatment. Response rates (AAPOR RR1) by treatment ranged from 35.6% to 36.4%, and are not significantly different across treatments (χ^2=0.12, p=0.99; see Table 2.2 in Chapter 2). Additionally, respondents' age, education, and literacy do not differ across treatments (Table 3.2).

[2]The counties located in southeast Nebraska near UNL are Butler, Cass, Dodge, Douglas, Fillmore, Gage, Jefferson, Johnson, Lancaster, Nemaha, Otoe, Pawnee, Polk, Richardson, Saline, Sarpy, Saunders, Seward, Thayer, Washington, and York.

Table 3.1: Percent of Respondents in each age and education group by Experimental Treatment for the Labor Survey

	Age		**Education**	
Treatment	**<60**	**60+**	**Less Than College Degree**	**At Least Bachelor's Degree**
Control Form:				
No Added Elements	55.3%	44.1%	67.3%	32.2%
Enclosure Only	54.5%	44.4%	66.7%	32.8%
Indentation Only	55.0%	43.8%	65.1%	34.6%
Sub-Numbering Only	49.1%	49.6%	64.6%	35.4%
Enclosure * Indentation	54.8%	43.5%	68.6%	31.1%
Enclosure * Sub-Numbering	52.2%	47.2%	69.3%	30.7%
Indentation * Sub-Numbering	53.0%	45.3%	67.2%	32.6%
Enclosure * Indentation * Sub-Numbering	55.2%	42.3%	67.1%	32.0%
Overall	**53.6%**	**45.0%**	**67.0%**	**32.6%**
	$\chi^2 = 5.275$, p = 0.626		$\chi^2 = 3.040$, p = 0.881	

3.3.3 Measuring Skip Errors

This chapter uses the same indicator variables for skip pattern errors as used in Chapter 2. Specifically, the filter question outcome indicator is a binomial variable capturing whether respondents skipped (1) or answered the filter question (0). The follow-up question outcome indicator is a multinomial variable indicating if the respondent had omission errors (1), commission errors (2), or no errors on the follow-up questions (0). These indicator variables can take on a missing value if the respondent was not eligible to have an error for that skip pattern (see Chapter 2 for more detail).

Table 3.2: Percent of respondents with each age, education, and literacy group by experimental treatment for UNL survey

	Age		**Education**		**Literacy**	
Treatment	**<60**	**60+**	**Less Than College Degree**	**At Least Bachelor's Degree**	**Low Literacy**	**High Literacy**
Control Form:						
No Added Elements	54.1%	45.9%	58.5%	40.7%	11.1%	87.8%
Enclosure Only	60.3%	39.7%	52.9%	47.1%	13.6%	84.2%
Indentation Only	52.1%	47.9%	56.6%	42.3%	13.9%	83.9%
Enclosure * Indentation	59.0%	41.0%	55.3%	44.7%	14.7%	85.0%
Overall	**56.4%**	**43.6%**	**55.8%**	**43.7%**	**13.3%**	**85.2%**
	$\chi^2 = 5.052$, p = 0.168		$\chi^2 = 2.187$, p = 0.535		$\chi^2 = 1.650$, p = 0.648	

3.3.4 Measuring Linguistic Ability

To measure linguistic ability, this study uses proxies consistent with previous research: age, education, and literacy (Knauper et al., 1997; Knauper, 1999; Knauper et al., 2007; Krosnick, 1991; Krosnick et al., 1996; Narayan and Krosnick, 1996; Al-Tayyib et al., 2002; Olson et al., 2011; Smyth et al., 2011). Both the UNL and the labor surveys ask respondents what year they were born, so the respondents' age is calculated by subtracting the respondents' year of birth from the year the survey was fielded and then coded into a dichotomous variable. Previous studies measuring age effects used a cut off of 60 (Stern et al., 2007) or 65 (Knauper, 1999) years old. Because the labor survey asks about the respondent's current job status and other job related questions, it is important to have working respondents in both age groups. As the current retirement age to receive social security benefits in the US is around 66 years old, the dichotomous age variable will use an age cut off of 60 years. This will allow for respondents in each age group to take both paths of a skip pattern that filters based on the respondent's job status.

This age variable is then defined as (1) 60 years old or older, and (0) less than 60 years old.

To measure education, the labor survey had a series of yes/no questions that asked about whether or not the respondent had obtained each level of education. For example, there were separate questions for high school graduate and for receiving a graduate degree. From this set of questions, I identify the highest degree the respondent obtained, by taking the highest degree the respondent marked with a "yes" as the value of the new highest degree variable. For example, respondents who marked "yes" to "High School diploma", "Associate's degree", and "Bachelor's degree" would have a highest degree of "Bachelor's degree".[3] The UNL survey asked respondents what their highest degree or level of schooling they completed is with a single ordinal question. Both of these highest degree variables are then recoded into two groups: (1) less than college degree and (0) a Bachelor's or graduate degree.

The Self-Administered Literacy Index (SALI—Olson et al., 2011) is used as a measure of literacy in the UNL survey. The SALI is a scale of five items, which ask about the respondent's English understanding, reading, and writing as well as the type and number of reading materials in the respondent's home. Respondents are then scored based on their answers to the five questions, resulting in a scale from 0—where respondents have no reading material in the house and do not

[3]Imputation using MICE was completed for respondents with missing data on any of the education questions in the Labor Survey as some questions had over 100 missing cases. All available demographic variables were included in the imputation: gender, age, answer to the other education questions, and race. The final imputed data was determined based on which value had the higher probability of imputation. For example, if a respondent received an imputation value of having a high school degree in three out of the five imputed datasets, the final imputed data indicated that the respondent has a high school degree. The full analysis on each of the five imputed datasets is located in Appendix P. Additionally, because education is used as an independent variable in the model and was asked across 5 of the skip patterns, only the 5 other skip patterns are used to determine skip errors in the analyses.

understand, read, or write English very well—to 5 where respondents have many books and other reading materials in the house and understand, read, and write English very well. Respondents are then classified into high and low literacy categories where a score of 4 or 5 means respondents have high literacy abilities (coded as 0), and a score of 0, 1, 2, or 3 means respondents have low literacy abilities (coded as 1). The SALI questions were not asked in the labor survey; therefore, literacy is only examined for the UNL survey.

3.3.5 Analysis Methods

To test the hypotheses about differential effects for respondents with different levels of linguistic abilities, I first conduct a bivariate analysis looking at the overall proportion of skip patterns in which each type of error was made across linguistic ability levels. To calculate the proportions, I divide the total number of occurrences of the error type by the total number of opportunities (skip patterns) across respondents with each characteristic,

$$p_k = \frac{\sum_{j=1}^{n_k} \sum_{i=1}^{s} error_{ij}}{n_k * s} \tag{3.1}$$

where p_k is the proportion of errors for respondent characteristic k, $error_{ij}$ is the indicator of whether respondent j made a skip error on skip pattern i, n_k is the total number of respondents with characteristic k, and s is the total number of skip pattern occurrences. I test for significant differences between levels of respondent linguistic ability using t-tests. This bivariate analysis allows me to understand if respondents with low linguistic ability have more errors than respondents with high linguistic ability.

For the second analysis, I delve further into these error sources by incorporating both the experimental treatment and the respondents' linguistic ability proxies in multilevel multivariate regression models, which adjusts for the respondent variance. These models include the linguistic ability proxy measures as both main effects and interactive effects with the visual design treatments. This interaction between the respondent characteristics and the visual design elements allow me to understand the differential effects for respondents with differing linguistic abilities for each element and combination of elements. Because the previous chapter found that the combination forms of enclosure and indentation with sub-numbering were not statistically significant in the overall models (see chapter 2) and I do not hypothesize any differences for the combination forms with sub-numbering, the models estimated will not include these interaction effects.

A multilevel logistic model, where skip patterns are nested within respondents, is used to predict the probability respondents will have item nonresponse to the filter question based on their characteristics and the visual elements they received on the survey (Equation 3.2). In this model, i represents the skip pattern, j represents the respondent, $error_{ij}$ is an indicator of whether respondent j had item nonresponse for skip pattern i, and u_j is the random intercept coefficient for respondent j. Additionally, the model contains indicators for whether the form respondent j was assigned contained enclosure ($Enclosure_j$), indentation ($Indentation_j$), or sub-numbering ($SubNumbering_j$), as well as whether respondent j is 60 years old or older (Age_j) or has less than a college degree ($Education_j$).

The model defined in equation 3.2 is the full model for the Age interactions in the labor survey. The model for education replaces Age_j in the interaction terms with $Education_j$. The UNL model for age is the same as Equation 3.2, with the

exception of the indicator for sub-numbering. The UNL survey did not contain the sub-numbering experiment. However, the UNL model did capture the respondent's literacy as a proxy for linguistic ability ($Literacy_j$). Therefore, the UNL model also includes $Literacy_j$ as a main effect.

The analysis of both models includes examining first the main effects then adding in the interaction terms of whether respondent j is 60 years old or older, has less than a college degree, or is classified as having low literacy levels. I estimate two models for the labor survey and three models for the UNL survey to incorporate the interactions individually. By building the models in this manner, I can gain insight into both the main effects of the respondent characteristics as well as whether linguistic ability modifies the effect of the visual design elements.

$$\begin{aligned} logit(Error_{ij}) = u_j + \alpha &+ \beta_1 Enclosure_j + \beta_2 Indentation_j \\ &+ \beta_3 SubNumbering_j + \beta_4 Enclosure_j Indentation_j \\ &+ \beta_5 Age_j \\ &+ \beta_6 Education_j \\ &+ \beta_7 Enclosure_j Age_j \\ &+ \beta_8 Indentation_j Age_j \\ &+ \beta_9 SubNumbering_j Age_j \\ &+ \beta_{10} Enclosure_j Indentation_j Age_j \\ &+ \varepsilon_{ij} \end{aligned} \tag{3.2}$$

I also use multilevel multinomial models where respondents are nested within skip patterns to predict the probability respondents will have omission or commission errors based on their characteristics and the visual elements they received on the survey (Equation 3.3). The indicators of visual design elements and respondent characteristics are the same as in equation 3.2. However, the models for

the omission and commission errors are multinomial models instead of logistic models to measure the probability respondents have either omission or commission errors compared to no errors on the follow-up questions. Therefore, in these equations, k represents the error type (omission, commission, no error) such that $error_{ijk}$ is an indicator of whether respondent j had error k for skip pattern i, u_{jk} is the random intercept coefficient for respondent j and error k, α_k is the intercept coefficient for error k, and β_k's are the coefficients for each independent variable for each error k.

$$\begin{aligned} logit(Error_{ijk}) = u_{jk} + \alpha_k &+ \beta_{1k}Enclosure_j + \beta_{2k}Indentation_j \\ &+ \beta_{3k}SubNumbering_j + \beta_{4k}Enclosure_jIndentation_j \\ &+ \beta_{5k}Age_j \\ &+ \beta_{6k}Education_j \\ &+ \beta_{7k}Enclosure_jAge_j \\ &+ \beta_{8k}Indentation_jAge_j \\ &+ \beta_{9k}SubNumbering_jAge_j \\ &+ \beta_{10k}Enclosure_jIndentation_jAge_j \\ &+ \varepsilon_{ijk} \end{aligned} \tag{3.3}$$

As with the models for item nonresponse to the filter questions, I first examine the main effects and then add in the interactions for each respondent characteristic. By building the models in this manner, I can gain insight into both the main effects of the respondent characteristics as well as whether linguistic ability modifies the effect of the visual design elements.

3.4 **Results**

3.4.1 Item Nonresponse on the Filter Question

Analysis 1: Overall Effects

First, I examine the rate of item nonresponse to the filter question for respondents with each linguistic ability characteristic (Table 3.3). As expected, we see that older, less educated, and lower literacy respondents had more item nonresponse to the filter question in both surveys compared to younger, more educated and higher literacy respondents. These results support hypothesis H3.1, which states that respondents with lower linguistic abilities will have higher rates of item nonresponse to the filter question.

Table 3.3: Percent of skip patterns where respondents of different linguistic ability levels had item nonresponse errors for the Labor and UNL surveys overall

Linguistic Ability	**Labor Survey**		**UNL Survey**	
Older Respondents (60+)	5.1%	t = -2.85,	1.9%	t = -5.23,
Younger Respondents (<60)	4.0%	p = 0.004	0.6%	p < 0.001
Less than college degree	5.0%	t = -5.21,	1.3%	t = -2.44,
At least college degree	3.2%	p < 0.001	0.7%	p = 0.015
Low Literacy Respondents	—		2.3%	t = -3.01,
High Literacy Respondents			0.9%	p = 0.003

Analysis 2: Multivariate

The next step is to account for the experimental treatments by modeling item nonresponse rates on the filter question in the multilevel logistic models defined in Equation 3.2. First, I look at the multilevel logistic model for the main effects only (Labor survey: Table 3.4, UNL survey: Table 3.5). Older, less educated, and lower literacy respondents all had higher odds of having item nonresponse to the filter

question compared to their counterparts in both surveys. Although the coefficients for age and education were only significant in the labor survey model, this trend indicates support for hypothesis H3.1, which states that respondents with lower linguistic abilities have higher rates of item nonresponse to the filter question.

Table 3.4: Odds ratios for the multilevel logistic regression predicting the probability respondents with different age and education levels have item nonresponse on the filter question for Labor survey

Parameter	**Main Effects**
Intercept	0.004* (0.002, 0.008)
Enclosure	1.071 (0.809, 1.418)
Indentation	0.943 (0.713, 1.248)
Sub-Numbering	1.297 (0.980, 1.718)
Age: 60 years old or Older	1.179 (0.888, 1.566)
Education: Less than College Degree	1.760* (1.286, 2.410)
Respondent Variance	5.7805
ICC	0.6373
-2*Log-Likelihood	4293.26
AIC	4307.26

n = 12,573

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, and have at least a college degree.

To assess the impact of the visual design elements on the respondent characteristics, I incorporate the two-way and then three-way interaction terms into the models (Labor-Table 3.6, UNL-Tables 3.7 and 3.8). There are no statistically significant interaction terms in either models (no support for hypotheses H3.2-H3.5) indicating that respondents with lower levels of linguistic ability do not perceive

Table 3.5: Odds ratios for the multilevel logistic regression predicting the probability respondents with different age, education, and literacy levels have item nonresponse on the filter question for UNL survey

Parameter	**Main Effects**
Intercept	0.000* (0.000, 0.000)
Enclosure	1.066 (0.406, 2.801)
Indentation	0.558 (0.208, 1.492)
Age: 60 years old or Older	2.204 (0.814, 5.972)
Education: Less than College Degree	1.238 (0.440, 3.483)
Low-Literacy	2.457 (0.767, 7.873)
Respondent Variance	25.8681
ICC	0.8872
-2*Log-Likelihood	801.38
AIC	815.38

n = 8,218

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, have at least a college degree, and have high-literacy levels.

and utilize these elements differently than respondents with higher levels of linguistic ability when navigating the filter question.

Table 3.6: Odds ratios for the multilevel logistic regression with interaction effects predicting the probability respondents with different age and education levels have item nonresponse on the filter question for Labor survey

Parameter	2-way Interactions		3-way Interactions	
	Age	Education	Age	Education
Intercept	0.004* (0.002, 0.007)	0.003* (0.001, 0.007)	0.004* (0.002, 0.008)	0.004* (0.002, 0.009)
Enclosure	1.238 (0.776, 1.975)	1.232 (0.674, 2.254)	1.208 (0.711, 2.052)	0.875 (0.410, 1.867)
Indentation	1.074 (0.674, 1.713)	1.235 (0.679, 2.244)	1.046 (0.616, 1.776)	0.893 (0.428, 1.862)
Sub-Numbering	1.621* (1.115, 2.355)	1.763* (1.030, 3.019)	1.622* (1.116, 2.357)	1.752* (1.026, 2.989)
Enclosure * Indentation	0.798 (0.458, 1.392)	0.789 (0.451, 1.380)	0.840 (0.399, 1.771)	1.535 (0.534, 4.413)
Age: 60 years old or Older	1.650 (0.931, 2.922)	1.174 (0.885, 1.557)	1.602 (0.845, 3.034)	1.179 (0.890, 1.561)
Education: Less than College Degree	1.737* (1.272, 2.372)	2.502* (1.295, 4.834)	1.738* (1.272, 2.373)	1.973 (0.963, 4.042)
Enclosure * Age	0.917 (0.524, 1.606)		0.969 (0.442, 2.124)	
Indentation * Age	0.956 (0.546, 1.672)		1.014 (0.462, 2.224)	
Sub-Numbering * Age	0.602 (0.344, 1.053)		0.601 (0.344, 1.053)	
Enclosure * Indentation * Age			0.890 (0.291, 2.728)	
Enclosure * Education		0.969 (0.519, 1.809)		1.545 (0.637, 3.745)
Indentation * Education		0.813 (0.435, 1.519)		1.275 (0.536, 3.036)
Sub-Numbering * Education		0.654 (0.349, 1.229)		0.656 (0.351, 1.228)
Enclosure * Indentation * Education				0.399 (0.115, 1.382)
Respondent Variance	5.5218	5.5248	5.6368	5.4796
ICC	0.6266	0.6268	0.6315	0.6248
-2*Log-Likelihood	4289.40	4289.30	4290.45	4288.36
AIC	4311.40	4313.30	4312.45	4312.36

n = 12,573

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, and have at least a college degree.

Table 3.7: Odds ratios for the multilevel logistic regression with 2-way interaction effects predicting the probability respondents with different age, education, and literacy levels have item nonresponse to filter question—UNL survey

Parameter	**Age**		**Education**		**Literacy**	
Intercept	0.000*	(0.000, 0.001)	0.000*	(0.000, 0.001)	0.000*	(0.000, 0.001)
Enclosure	0.982	(0.186, 5.186)	0.744	(0.120, 4.621)	0.882	(0.228, 3.410)
Indentation	0.536	(0.082, 3.492)	0.778	(0.125, 4.845)	0.678	(0.165, 2.789)
Enclosure * Indentation	0.814	(0.113, 5.853)	0.847	(0.118, 6.067)	0.803	(0.111, 5.805)
Age: 60 years old or Older	1.745	(0.348, 8.761)	2.200	(0.815, 5.935)	2.188	(0.814, 5.883)
Education: Less than College Degree	1.246	(0.443, 3.504)	1.052	(0.201, 5.495)	1.229	(0.439, 3.440)
Low-Literacy	2.438	(0.759, 7.830)	2.442	(0.760, 7.848)	1.391	(0.159, 12.163)
Enclosure * Age	1.320	(0.185, 9.433)				
Indentation * Age	1.265	(0.167, 9.574)				
Enclosure * Education			1.960	(0.261, 14.696)		
Indentation * Education			0.667	(0.086, 5.150)		
Enclosure * Literacy					3.409	(0.311, 37.379)
Indentation * Literacy					0.740	(0.070, 7.840)
Respondent Variance	25.7494		25.3615		24.9301	
ICC	0.8867		0.8852		0.8834	
-2*Log-Likelihood	801.21		800.74		800.19	
AIC	821.21		820.74		820.19	

n = 8,218

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, have at least a college degree, and have high-literacy levels.

Table 3.8: Odds ratios for the multilevel logistic regression with 3-way interaction effects predicting the probability respondents with different age, education, and literacy levels have item nonresponse to filter question—UNL survey

Parameter	**Age**		**Education**		**Literacy**	
Intercept	0.000*	(0.000, 0.001)	0.000*	(0.000, 0.001)	0.000*	(0.000, 0.001)
Enclosure	0.967	(0.148, 6.318)	0.502	(0.057, 4.448)	0.662	(0.163, 2.695)
Indentation	0.525	(0.055, 5.015)	0.523	(0.059, 4.664)	0.494	(0.111, 2.200)
Enclosure * Indentation	0.850	(0.036, 20.275)	2.059	(0.080, 52.752)	1.614	(0.182, 14.329)
Age: 60 years old or Older	1.722	(0.286, 10.376)	2.226	(0.827, 5.991)	2.137	(0.805, 5.674)
Education: Less than College Degree	1.247	(0.443, 3.508)	0.795	(0.131, 4.831)	1.240	(0.452, 3.405)
Low-Literacy	2.435	(0.757, 7.837)	2.457	(0.764, 7.900)	0.395	(0.011, 14.449)
Enclosure * Age	1.356	(0.111, 16.588)				
Indentation * Age	1.311	(0.074, 23.069)				
Enclosure * Indentation * Age	0.932	(0.016, 53.742)				
Enclosure * Education			3.542	(0.246, 50.978)		
Indentation * Education			1.296	(0.078, 21.512)		
Enclosure * Indentation * Education			0.246	(0.004, 14.441)		
Enclosure * Literacy					20.499	(0.349, 1202.300)
Indentation * Literacy					6.448	(0.089, 467.130)
Enclosure * Indentation * Literacy					0.029	(0.000, 6.058)
Respondent Variance	25.7479		24.9136		23.1481	
ICC	0.8867		0.8834		0.8756	
-2*Log-Likelihood	801.21		800.29		798.33	
AIC	823.21		822.29		820.33	

n = 8,218

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, have at least a college degree, and have high-literacy levels.

Summary of Hypothesis Findings for Item Nonresponse on the Filter

Results from both studies indicate that respondents with lower linguistic abilities have higher rates of item nonresponse to the filter question compared to respondents with higher linguistic abilities (hypothesis H3.1). These findings were significant for all three measures of linguistic ability in both surveys when looking at the overall error rates (analysis 1). When accounting for the respondent variance and the visual design elements in the multivariate model, only education in the labor survey was significant, however the trend still existed for age in the labor survey and age, education and literacy in the UNL survey.

The results of these studies also indicate that the visual grouping treatments have no differential effects on the probability of item nonresponse to the filter question for respondents with low and high linguistic abilities (hypotheses H3.2-H3.5). This means that the added visual design elements do not increase or decrease rates of item nonresponse to the filter question further for respondents with lower linguistic abilities compared to respondents with higher linguistic abilities.

3.4.2 Omission and Commission Errors

Analysis 1: Overall Effects

Moving to omission and commission errors, I first examine the percent of skip patterns where respondents had omission and commission errors on the follow-up questions for each linguistic ability characteristic (Tables 3.9 and 3.10). First looking at the rate of omission errors, we see a trend that older, less educated, and lower literacy respondents had more omission errors in both surveys. However, this difference is only significant for older respondents in the UNL survey. On the other hand, looking at the rate of commission errors, older, less educated, and lower

literacy respondents had more commission errors across both surveys and all these differences are significant. These results support the hypothesis that respondents with lower linguistic abilities will have more error rates compared to their counterparts (H3.1) for the rate of commission errors but this hypothesis is only partially supported for the rate of omission errors.

Table 3.9: Percent of skip patterns where respondents of different linguistic ability levels had omission and commission errors on the follow-up questions for the Labor survey overall

Linguistic Ability	**Omission Errors**		**Commission Errors**	
Older Respondents (60+)	0.4%	t = 1.04,	6.0%	t = -9.17,
Younger Respondents (<60)	0.5%	p = 0.298	2.4%	p < 0.001
Less than college degree	0.5%	t = -1.22,	4.6%	t = -7.13,
At least college degree	0.4%	p = 0.221	2.3%	p < 0.001

Table 3.10: Percent of skip patterns where respondents of different linguistic ability levels had omission and commission errors on the follow-up questions for the UNL survey overall

Linguistic Ability	**Omission Errors**		**Commission Errors**	
Older Respondents (60+)	2.9%	t = -2.59,	3.3%	t = -4.00,
Younger Respondents (<60)	2.0%	p = 0.010	1.9%	p < 0.001
Less than college degree	2.5%	t = -0.90,	3.1%	t = -4.66,
At least college degree	2.2%	p = 0.370	1.6%	p < 0.001
Low Literacy Respondents	2.9%	t = -1.16,	4.0%	t = -3.01,
High Literacy Respondents	2.3%	p = 0.245	2.2%	p = 0.003

Analysis 2: Multivariate

The next step is to account for the experimental treatments by modeling omission

and commission errors in the multilevel multinomial models defined in Equation 3.3. First, I look at the multilevel multinomial model for the main effects only (Labor survey: Table 3.11, UNL survey: Table 3.12). Older and less educated respondents had higher odds of having commission errors on the follow-up questions compared to their counter parts in both surveys. Respondents who have lower literacy levels also had higher odds of having commission errors, but it was not statistically significant in the UNL survey. As with analysis 1, these results show support for hypothesis H3.1 that respondents with lower linguistic abilities have higher commission error rates compared to respondents with higher linguistic abilities. On the other hand, none of the proxies of linguistic ability are statistically significant in the omission error models. Therefore, there is no support for hypothesis H3.1 for omission errors.

To assess the impact of the visual design elements on the respondent characteristics, I incorporate the two-way and then three-way interaction terms into the models (Labor: Age-Table 3.13, Education-Table 3.14; UNL: Age-Table 3.15, Education-Table 3.16, Literacy-Table 3.17). Across all models, none of the interaction terms are statistically significant. This means that respondents with low linguistic abilities do not perceive or utilize the visual design elements differently than respondents with high linguistic abilities when navigating the follow-up questions. These results indicate no support for any of the hypotheses focusing on these differential effects (H3.2-H3.5).

Table 3.11: Odds ratios for the multilevel multinomial regression main effects only predicting the probability respondents with different age and education levels have omission and commission errors on follow-up questions for Labor survey

Parameter	**Omission Errors**	**Commission Errors**
Intercept	0.004* (0.002, 0.008)	0.021* (0.016, 0.028)
Enclosure	0.735 (0.419, 1.292)	0.696* (0.572, 0.846)
Indentation	0.894 (0.512, 1.560)	0.950 (0.784, 1.152)
Sub-Numbering	1.798* (1.008, 3.209)	0.777* (0.641, 0.943)
Age: 60 years old or Older	0.559 (0.297, 1.055)	2.336* (1.921, 2.841)
Education:		
Less than College Degree	1.295 (0.706, 2.378)	1.932* (1.525, 2.447)
Respondent Variance	0.0000	0.0000
ICC	0.0000	0.0000
-2*Log Pseudo-Likelihood	155362.7	

n = 12,573

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, and have at least a college degree.

Table 3.12: Odds ratios for the multilevel multinomial regression main effects only predicting the probability respondents with different age, education, and literacy levels have omission and commission errors on follow-up questions for UNL survey

Parameter	**Omission Errors**		**Commission Errors**	
Intercept	0.009*	(0.005, 0.014)	0.005*	(0.003, 0.009)
Enclosure	0.771	(0.543, 1.094)	0.746	(0.504, 1.104)
Indentation	1.673*	(1.174, 2.382)	1.257	(0.850, 1.859)
Age: 60 years old or Older	1.398	(0.981, 1.992)	1.615*	(1.085, 2.404)
Education:				
Less than College Degree	1.042	(0.724, 1.498)	1.715*	(1.125, 2.613)
Low-Literacy	1.268	(0.774, 2.078)	1.554	(0.919, 2.627)
Respondent Variance	1.2784		1.6380	
ICC	0.2798		0.3324	
-2*Log-Likelihood	3521.87			
AIC	3549.87			

n = 8,137

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, have at least a college degree, and have high literacy levels.

Table 3.13: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability respondents with different age levels have omission and commission errors on follow-up questions for Labor survey

	Age: 2-way Interactions				**Age: 3-way Interaction**			
	Omission		**Commission**		**Omission**		**Commission**	
Parameter	**Errors**		**Errors**		**Errors**		**Errors**	
Intercept	0.004*	(0.002, 0.009)	0.021*	(0.015, 0.029)	0.004*	(0.002, 0.009)	0.021*	(0.015, 0.030)
Enclosure	0.593	(0.255, 1.383)	0.749	(0.523, 1.072)	0.632	(0.257, 1.550)	0.736	(0.482, 1.123)
Indentation	0.783	(0.359, 1.708)	1.034	(0.738, 1.450)	0.825	(0.363, 1.877)	1.019	(0.693, 1.499)
Sub-Numbering	1.937	(0.984, 3.814)	0.757	(0.559, 1.024)	1.937	(0.984, 3.813)	0.757	(0.559, 1.024)
Enclosure * Indentation	1.059	(0.338, 3.317)	0.771	(0.520, 1.143)	0.921	(0.241, 3.525)	0.801	(0.434, 1.479)
Age: 60 years old or Older	0.392	(0.096, 1.596)	2.171*	(1.500, 3.142)	0.445	(0.098, 2.015)	2.143*	(1.429, 3.213)
Education:								
Less than College Degree	1.286	(0.700, 2.363)	1.935*	(1.527, 2.451)	1.285	(0.699, 2.362)	1.934*	(1.527, 2.451)
Enclosure * Age	2.013	(0.558, 7.265)	1.092	(0.732, 1.627)	1.548	(0.247, 9.720)	1.125	(0.649, 1.950)
Indentation * Age	1.510	(0.418, 5.458)	1.038	(0.701, 1.536)	1.174	(0.194, 7.111)	1.064	(0.641, 1.767)
Sub-Numbering * Age	0.772	(0.208, 2.858)	1.044	(0.704, 1.548)	0.775	(0.209, 2.871)	1.044	(0.704, 1.547)
Enclosure * Indentation * Age					1.668	(0.127,21.857)	0.938	(0.422, 2.087)
Respondent Variance	0.0000		0.0000		0.0000		0.0000	
ICC	0.0000		0.0000		0.0000		0.0000	
-2*Log Pseudo-Likelihood	155686.3				155738.0			

n = 12,573

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, and have at least a college degree.

Table 3.14: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability respondents with different education levels have omission and commission errors on follow-up questions for Labor survey

	Education: 2-way Interactions				**Education: 3-way Interaction**			
	Omission		**Commission**		**Omission**		**Commission**	
Parameter	**Errors**		**Errors**		**Errors**		**Errors**	
Intercept	0.001*	(0.000, 0.006)	0.021*	(0.014, 0.032)	0.002*	(0.000, 0.008)	0.020*	(0.013, 0.032)
Enclosure	1.240	(0.379, 4.063)	0.723	(0.449, 1.164)	0.804	(0.179, 3.608)	0.779	(0.426, 1.426)
Indentation	1.054	(0.322, 3.454)	1.136	(0.727, 1.774)	0.684	(0.152, 3.067)	1.203	(0.707, 2.047)
Sub-Numbering	4.282*	(1.205,15.221)	0.685	(0.448, 1.047)	4.224*	(1.188,15.017)	0.685	(0.448, 1.048)
Enclosure * Indentation	1.027	(0.327, 3.225)	0.775	(0.523, 1.148)	2.335	(0.292,18.649)	0.663	(0.276, 1.593)
Age: 60 years old or Older	0.550	(0.292, 1.038)	2.344*	(1.926, 2.851)	0.552	(0.292, 1.041)	2.344*	(1.927, 2.851)
Education:								
Less than College Degree	4.673	(1.026,21.279)	1.816*	(1.161, 2.841)	3.520	(0.726,17.064)	1.890*	(1.152, 3.099)
Enclosure * Education	0.464	(0.135, 1.590)	1.111	(0.682, 1.811)	0.844	(0.146, 4.896)	1.012	(0.515, 1.990)
Indentation * Education	0.773	(0.226, 2.650)	0.909	(0.566, 1.460)	1.368	(0.245, 7.637)	0.845	(0.462, 1.544)
Sub-Numbering * Education	0.308	(0.073, 1.296)	1.171	(0.727, 1.887)	0.311	(0.074, 1.307)	1.171	(0.727, 1.887)
Enclosure * Indentation * Education					0.302	(0.025, 3.694)	1.215	(0.455, 3.241)
Respondent Variance	0.0000		0.0000		0.0000		0.0000	
ICC	0.0000		0.0000		0.0000		0.0000	
-2*Log Pseudo-Likelihood	155855.6				155843.6			

n = 12,573

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, and have at least a college degree.

Table 3.15: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability respondents with different age levels have omission and commission errors on follow-up questions for UNL survey

	Age: 2-way Interactions		**Age: 3-way Interaction**	
	Omission	**Commission**	**Omission**	**Commission**
Parameter	**Errors**	**Errors**	**Errors**	**Errors**
Intercept	0.009* (0.005, 0.016)	0.004* (0.002, 0.009)	0.009* (0.005, 0.017)	0.005* (0.002, 0.010)
Enclosure	0.786 (0.416, 1.485)	0.770 (0.380, 1.557)	0.712 (0.336, 1.506)	0.693 (0.301, 1.592)
Indentation	1.832* (1.010, 3.321)	1.747 (0.898, 3.400)	1.687 (0.860, 3.308)	1.600 (0.749, 3.419)
Enclosure * Indentation	0.768 (0.378, 1.561)	0.660 (0.302, 1.443)	0.913 (0.340, 2.448)	0.802 (0.261, 2.469)
Age: 60 years old or Older	1.179 (0.622, 2.232)	1.566 (0.790, 3.103)	1.067 (0.503, 2.263)	1.424 (0.647, 3.135)
Education:				
Less than College Degree	1.044 (0.726, 1.502)	1.714* (1.127, 2.608)	1.049 (0.729, 1.509)	1.719* (1.130, 2.615)
Low-Literacy	1.260 (0.769, 2.066)	1.544 (0.916, 2.603)	1.253 (0.764, 2.055)	1.536 (0.912, 2.589)
Enclosure * Age	1.322 (0.657, 2.659)	1.445 (0.663, 3.153)	1.624 (0.549, 4.802)	1.768 (0.566, 5.528)
Indentation * Age	1.071 (0.528, 2.172)	0.767 (0.352, 1.672)	1.267 (0.480, 3.346)	0.911 (0.315, 2.631)
Enclosure * Indentation * Age			0.701 (0.169, 2.901)	0.684 (0.143, 3.268)
Respondent Variance	1.2747	1.6150	1.2740	1.6120
ICC	0.2793	0.3293	0.2791	0.3289
-2*Log-Likelihood	3518.29		3517.83	
AIC	3558.29		3561.83	

n = 8,137

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, have at least a college degree, and have high literacy levels.

Table 3.16: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability respondents with different education levels have omission and commission errors on follow-up questions for UNL survey

	Education: 2-way Interactions				**Education: 3-way Interaction**			
	Omission		**Commission**		**Omission**		**Commission**	
Parameter	**Errors**		**Errors**		**Errors**		**Errors**	
Intercept	0.007*	(0.004, 0.014)	0.006*	(0.003, 0.011)	0.007*	(0.003, 0.014)	0.006*	(0.003, 0.013)
Enclosure	1.197	(0.609, 2.353)	0.643	(0.294, 1.406)	1.409	(0.615, 3.227)	0.481	(0.182, 1.270)
Indentation	1.674	(0.859, 3.261)	1.330	(0.633, 2.794)	1.954	(0.867, 4.400)	1.048	(0.440, 2.494)
Enclosure * Indentation	0.794	(0.388, 1.624)	0.649	(0.296, 1.424)	0.596	(0.200, 1.774)	1.152	(0.300, 4.422)
Age: 60 years old or Older	1.406	(0.987, 2.003)	1.607*	(1.081, 2.389)	1.398	(0.982, 1.991)	1.615*	(1.087, 2.402)
Education:								
Less than College Degree	1.198	(0.620, 2.315)	1.196	(0.586, 2.440)	1.390	(0.629, 3.072)	0.975	(0.435, 2.187)
Low-Literacy	1.273	(0.776, 2.088)	1.522	(0.902, 2.568)	1.271	(0.776, 2.084)	1.531	(0.907, 2.583)
Enclosure * Education	0.583	(0.286, 1.189)	1.766	(0.771, 4.046)	0.432	(0.142, 1.318)	2.757	(0.830, 9.157)
Indentation * Education	1.229	(0.597, 2.529)	1.235	(0.542, 2.815)	0.961	(0.349, 2.645)	1.798	(0.600, 5.384)
Enclosure * Indentation * Education					1.672	(0.392, 7.124)	0.423	(0.081, 2.215)
Respondent Variance	1.2657		1.6221		1.2592		1.6159	
ICC	0.2778		0.3302		0.2768		0.3294	
-2*Log-Likelihood	3515.63				3514.11			
AIC	3555.63				3558.11			

n = 8,137

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, have at least a college degree, and have high literacy levels.

Table 3.17: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability respondents with different literacy levels have omission and commission errors on follow-up questions for UNL survey

	Literacy: 2-way Interactions				**Literacy: 3-way Interaction**			
	Omission		**Commission**		**Omission**		**Commission**	
Parameter	**Errors**		**Errors**		**Errors**		**Errors**	
Intercept	0.008*	(0.005, 0.014)	0.004*	(0.002, 0.008)	0.008*	(0.005, 0.015)	0.004*	(0.002, 0.008)
Enclosure	0.880	(0.501, 1.546)	0.872	(0.477, 1.594)	0.791	(0.438, 1.430)	0.830	(0.440, 1.565)
Indentation	1.947*	(1.177, 3.222)	1.682	(0.964, 2.935)	1.793*	(1.067, 3.013)	1.613	(0.904, 2.877)
Enclosure * Indentation	0.774	(0.380, 1.573)	0.678	(0.309, 1.486)	0.928	(0.429, 2.006)	0.744	(0.314, 1.767)
Age: 60 years old or Older	1.393	(0.978, 1.985)	1.612*	(1.084, 2.398)	1.384	(0.971, 1.972)	1.605*	(1.079, 2.388)
Education:								
Less than College Degree	1.049	(0.729, 1.510)	1.738*	(1.140, 2.647)	1.051	(0.731, 1.513)	1.743*	(1.144, 2.656)
Low-Literacy	1.351	(0.534, 3.417)	1.882	(0.739, 4.794)	0.886	(0.258, 3.045)	1.607	(0.524, 4.933)
Enclosure * Literacy	1.108	(0.420, 2.919)	1.288	(0.459, 3.617)	2.275	(0.474,10.922)	1.709	(0.386, 7.573)
Indentation * Literacy	0.816	(0.305, 2.187)	0.533	(0.190, 1.497)	1.550	(0.349, 6.879)	0.711	(0.161, 3.145)
Enclosure * Indentation * Literacy					0.297	(0.039, 2.249)	0.574	(0.072, 4.559)
Respondent Variance	1.2749		1.6247		1.2719		1.6236	
ICC	0.2793		0.3306		0.2788		0.3304	
-2*Log-Likelihood	3518.31				3516.63			
AIC	3558.31				3560.63			

n = 8,137

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, are less than 60 years old, have at least a college degree, and have high literacy levels.

Summary of Hypothesis Findings for Omission and Commission Errors

There is only one significant association across these two main effect models. Results from both studies indicate that respondents with lower linguistic abilities have higher rates of commission errors on the follow-up questions compared to respondents with higher linguistic abilities (Hypothesis H3.1). The same finding was not found for omission errors, indicating that respondents with both levels of linguistic abilities omit the follow-up questions at the same rate. One possible reason for this is that low linguistic ability respondents could be more likely to answer all questions on the page and not navigate the skip patterns. This would lead to higher rates of commission errors as they answer questions they are supposed to skip, but would result in fewer omission errors as they are answering the follow-up questions regardless. Respondents with high linguistic ability, on the other hand, are attempting to navigate the skip patterns correctly which leads to lower rates of both omission and commission errors. This discrepancy would lead to a difference in the commission errors and no difference in the omission errors.

Based on the results from the models with the interaction terms, it appears that the visual grouping treatments have no differential effects on the probability of omission and commission errors on the follow-up questions for respondents with low and high linguistic abilities (Hypotheses H3.2-H3.5). Although these added elements do not decrease error rates further for respondents with lower linguistic abilities compared to respondents with higher linguistic abilities, it is important to note that they do not increase the rates of error either.

3.5 **Conclusion**

There are two key findings from this study. First, older, less educated, and lower literacy respondents have higher rates of item-nonresponse to the filter question and

commission errors compared to younger, more educated, and higher literacy respondents. This trend also existed for omission errors; however, the association was not statistically significant. This means that respondents with lower linguistic abilities have more difficulty correctly navigating the skip patterns. This finding corresponds to previous research on the topic, which indicated that complex survey tasks (such as skip patterns) cause issues for lower cognitive ability respondents (Knauper, 1999; Knauper et al., 2007; Narayan and Krosnick, 1996; Krosnick et al., 1996).

Second, the visual design elements did not differentially assist respondents with lower linguistic abilities compared to respondents with higher linguistic abilities. This means that respondents of all linguistic abilities perceived and utilized these visual design elements similarly. While these results do not provide a clear best design to assist respondents with low linguistic abilities in navigating skip patterns, none of the visual design elements increased errors further for these respondents. Therefore, to assist respondents with low linguistic abilities, researchers can implement the visual design elements that had the lowest overall rates of error: the combination of enclosure and indentation (see Chapter 2).

It is important to note that the results from the labor survey may not be generalizable due to the way the labor survey asked for the respondent's education. Because of this, only five skip patterns could be used in this analysis for the labor survey. The minimal number of skip patterns and the fact that the labor survey only contained behavioral filter and follow-up questions could be a reason for the lack of significant differences across the respondent characteristics and visual design elements. Future research should further examine the visual design element of sub-numbering to determine if these findings for the differential effects are consistent on other surveys with different types of questions in the skip patterns.

A limitation of both the labor survey and the UNL survey is that no measures of spatial ability were included. Respondents who have lower linguistic ability may also have lower spatial ability and therefore do not benefit from the addition of these visual design elements which appeal to the spatial ability of respondents. Future studies should measure the spatial as well as the linguistic abilities of respondents to see if the added visual design elements assist respondents with high spatial ability and low linguistic ability. Additionally, it is possible that the proxies chosen in this research are weak proxies of linguistic ability. Future research should consider other possible proxies to better understand the relationship between linguistic ability and skip pattern errors.

Future research should also explore other visual grouping strategies due to the fact that this research found no dominant visual design element for reducing errors for respondents with lower linguistic abilities. Additionally, it is possible that the visual design elements used in this research reduce errors for other respondent characteristics. The next chapter of this dissertation will look at the effect of these visual design elements on skip errors for respondents with differing levels of motivation, to test whether these elements differentially impact people with different levels of motivation.

Chapter 4: Using Visual Design Grouping Principles to Improve Data Quality of Skip Patterns for Less Motivated Respondents

4.1 Introduction

Motivation is a key component of data quality in surveys. Researchers have found that less motivated respondents provide poor quality data such as by satisficing or not answering all items (Krosnick, 1991; Stern et al., 2012). The issue of poor quality data is generally related to the difficulty of the task. For example, providing respondents with a long list of response options will result in higher rates of satisficing (Krosnick, 1991). Other complex survey tasks such as skip patterns could also result in higher rates of errors. Because skip patterns require respondents to pay close attention to the detailed navigation instructions and unmotivated respondents are less likely to deeply process these items, these less motivated respondents may be more likely to make one of the three types of skip errors—item nonresponse to the filter question, omission errors on the follow-up questions, or commission errors on the follow-up questions.

In general, survey researchers can reduce respondent burden for less motivated respondents and gain better quality data by either removing the difficult questions or changing the way the questions are asked to make them easier to answer. However, skip patterns often cannot be removed from mail surveys as not all questions apply to each respondent and there is no interviewer or computer to navigate the respondent past these questions. With the rise in popularity of mail surveys, improving data quality of skip patterns is essential for survey research. Therefore, an important challenge in mail surveys is finding ways to design skip instructions to minimize respondent errors, both overall and especially for

respondents with low motivation levels.

Previous research on skip patterns has found that visually grouping the follow-up questions using the combination of separate background and indentation can reduce skip errors overall (see Chapter 2), but none of the visual design elements tested reduced skip errors further for respondents with low cognitive ability compared to respondents with high cognitive ability (see Chapter 3). This chapter expands on these findings by examining the effects of the visual design elements (enclosure, indentation, and sub-numbering) on skip errors for respondents with different levels of motivation. Each design used in this chapter is intended to create stronger grouping and subgrouping among items within skip patterns, making the navigational path through them clearer and decreasing skip errors for respondents who may not take the time to process and follow the written instructions. The effectiveness of each design for respondents with differing levels of motivation is assessed by examining rates of omission and commission errors, as well as item nonresponse to the filter question.

4.2 **Background**

4.2.1 Respondent Motivation in Survey Research

Regardless of a respondent's ability to complete a survey, they still need to be motivated to complete the task (Beatty and Herrmann, 2002). Unmotivated respondents may satisfice resulting in poor quality data (Krosnick, 1991; Olson, 2013); these respondents are less motivated to accurately complete a survey. This lack of motivation for accuracy can result in higher error rates on complex survey tasks that require extra effort, such as skip patterns.

Motivation is hard to measure explicitly, therefore researchers commonly use two proxies for motivation in surveys—topic saliency and the number of contacts

required before the survey is returned (Groves et al., 2000, 2004; Olson, 2013; Smyth et al., 2009). Researchers have found that the topic of the survey is one of the major factors affecting whether respondents choose to respond to a survey (Groves et al., 1992, 2000, 2004). The topic of the survey and of each question can also have an impact on responses to individual questions (Stern et al., 2012; Holland and Christian, 2009; Beatty and Herrmann, 2002; Krosnick, 2002). For example, respondents who are not as interested in the topic of a particular question, may choose to select a "don't know" or "no opinion" option, or they may not respond to the question at all (Krosnick, 2002; Stern et al., 2012; Holland and Christian, 2009). This can lead to nonresponse bias if the reason for the nonresponse is related to the characteristic being measured (Groves and Peytcheva, 2008; Stern et al., 2012).

Stern and colleagues (2012) examined the effect of questionnaire design elements on both motivated and unmotivated respondents. The survey was focused on opinions about the community, and Stern and colleagues argued that the topic of the survey is more salient to respondents who report high community engagement (i.e., motivated) compared to respondents who report low community engagement (i.e., unmotivated). They found that respondents with lower community engagement were more affected by the design change to that question compared to respondents with higher community engagement. For example, they tested the inclusion of a "don't know" response for a scalar question and found that respondents for whom the topic was not as salient selected "don't know" at a higher rate when present compared to respondents who found the topic salient. They also found similar findings when comparing the visual design change of different size boxes for open-ended questions. Specifically, respondents for whom the topic was salient provided about the same number of words in both the bigger

and smaller boxes. On the other hand, respondents for whom the topic was not as salient provided more words when presented with the bigger box compared to when they were presented with the smaller box. This research suggests that less motivated respondents rely on the question design more compared to more motivated respondents. Therefore, using visual design elements on complex survey tasks, such as skip patterns, can increase data quality for respondents with less topic saliency.

Another proxy for motivation is the number of contacts used to get a response (Dillman et al., 2014; Smyth et al., 2009; Olson, 2013). Early responders (i.e., those that return the survey after only one mailing) are considered to be more motivated as they complete the survey when first asked, while late responders (i.e., those that return the survey after two or three mailings) are considered less motivated because it takes multiple requests before they respond to the survey. Research shows that late responders have more item nonresponse and worse quality responses (e.g., shorter open-ended responses) than early responders (Olson, 2013; Smyth et al., 2009).

Smyth and colleagues (2009) found that visual design can increase response quality for late responders to a web survey. Specifically, their study examined the effect of the size of the answer box for open-ended questions on the number of themes provided in the answer as well as the length of the answer. They found that while early responders had high quality data (respondents provided many words and themes) regardless of the visual design, the quality of responses for late responders was significantly better with the visual design aid and was closer to the quality of the early responders' answers (i.e., more words and themes in the larger answer box compared to the smaller answer box).

On other questionnaire tasks, adding visual design elements may also

differentially affect early and late responders. Specifically, using visual grouping elements in skip patterns could help simplify and clarify the response task and navigational path, making it less complex. This then could encourage less motivated respondents to attempt the skip patterns and follow them correctly, thus decreasing skip errors among this subgroup.

4.2.2 Visual Design in Skip Patterns

Researchers can utilize multiple visual design elements in skip patterns to assist less motivated respondents. Specifically, researchers should incorporate visual design elements from both the pre-attentive and the attentive stages of visual processing (Ware, 2012). In the pre-attentive stage, respondents identify the size, color, contrast, and shape of the visual elements and create groupings and patterns based on those characteristics. Items that can be classified during the pre-attentive stages of visual processing require little to no effort on the part of the respondent. This means that all respondents, including unmotivated respondents, can identify and create groupings easily. Items identified during attentive processing require respondents to focus on and analyze the individual items. At this point, less motived respondents may not put in the effort to understand and receive the cues from these elements.

By using multiple types of visual elements, researchers can ensure that respondents see the elements at multiple stages of visual processing. This also ensures that less motivated respondents will receive the cues early on if they do not put the effort into seeing and analyzing the elements received in the attentive stage. Christian and Dillman (2004) identify four main types of visual languages researchers can use in surveys: graphical, symbolic, verbal and numerical. In skip patterns, researchers can use background shapes or indent the follow-up questions

(graphical language), add arrows (symbolic language), use explicit instructions such as "Skip to 32" (verbal language) and use sub-numbering of the follow-up questions (numerical language) to assist respondents in navigating these skip patterns. Because graphical and symbolic languages tend to be identified and processed during early, pre-attentive processing, and verbal and numerical languages are typically processed during the later attentive processing stage (Ware, 2012), researchers can use these languages to provide cues to both motivated and unmotivated respondents with the goal of reducing skip pattern errors.

While there are a few studies looking at visual design elements in skip patterns (Redline et al., 2003; Gohring and Smyth, 2013; Smyth et al., 2011), none of them examine the effects of these for respondents with different motivation levels. Overall, Redline and colleagues found that the detection method (which included arrows, "(If yes)" at the beginning of the follow-up question, and instructions after the response option in the filter question; Figure 2.1 in Chapter 2) reduced the rates of both omission and commission errors compared to their control. Gohring and Smyth (2013) found mixed results when they indented the follow-up questions and flipped the response options in the filter question (Figure 2.2 in Chapter 2).

This dissertation expands on this research by visually grouping the follow-up questions using principles from visual processing theory and the Gestalt laws of pattern perception. Chapter 2 of this dissertation looked at the overall effects of this visual grouping. Out of the eight forms tested using common region (enclosure), proximity (indentation), and similarity (numbering) (Ware, 2012; Figures 2.3, 2.4 and 2.5 in Chapter 2), I found that using only sub-numbering increases item nonresponse to the filter questions, using only indentation increases omission error rates, but using only enclosure or the combination of enclosure and

indentation decreases rates of commission errors.

Additionally, chapter 3 of this dissertation looked at the effects of these visual design elements for respondents with different levels of cognitive ability. None of the visual design elements tested reduced skip errors further for respondents with low cognitive ability compared to respondents with high cognitive ability. However, it is important to note that none of the visual design elements tested increase skip errors for low cognitive ability respondents either.

Between these two chapters, I concluded that the best form is the enclosure and indentation form as overall the rates of commission errors are reduced, and the rates of skip errors are not significantly different for respondents with different levels of cognitive ability. This fourth chapter of this dissertation expands on these findings by examining these visual grouping elements for respondents with different levels of motivation. It is possible that certain visual grouping elements help respondents with less motivation complete the survey, resulting in higher quality data.

4.2.3 Hypotheses

Based on this previous literature, I develop a set of hypotheses for how the rates of skip pattern errors differ for respondents with different motivation levels, both overall, and when the visual grouping principles of common region, proximity, and similarity are present. Previous literature has found that respondents for whom the survey topic is less salient and respondents who respond after multiple contacts (late responders) have higher rates of item nonresponse and worse quality data (Stern et al., 2012; Holland and Christian, 2009; Beatty and Herrmann, 2002; Krosnick, 2002; Dillman et al., 2014; Smyth et al., 2009; Olson, 2013). Therefore, those for whom the survey is less salient or require more contacts may also be

reluctant to carry out complex survey tasks such as navigating skip patterns. I hypothesize that respondents who are less motived (i.e., lower salience or respond after multiple contacts) will have more skip errors than those who are more motivated (i.e., higher salience or respond after a single contact—H4.1).

Additional research has found that less motivated respondents (i.e., lower salience and late respondents) are more affected by visual design elements (Stern et al., 2012; Smyth et al., 2009). Using visual grouping elements in skip patterns could help simplify and clarify the response task and navigational path, making it less complex. This then could encourage less motivated respondents to attempt the skip patterns and follow them correctly, thus decreasing skip errors among this subgroup. Additionally, using visual design elements that are identified during pre-attentive processing could assist less motivated respondents as they do not need to focus on and analyze these elements to perceive them and use them as grouping mechanisms. More motivated respondents, on the other hand, are already hypothesized to have low error rates because they utilize the existing written instructions and symbols. This means that while more motivated respondents may see and utilize the added visual design elements, we do not expect to see a large decrease in the rate of errors for these respondents. Therefore, because separate enclosure and indentation are spatial elements typically identified during pre-attentive processing, I hypothesize that using separate enclosure (H4.2) or indentation (H4.3) will decrease skip errors further for respondents who are less motivated to complete the survey compared to respondents who are more motivated to complete the survey.

Identifying and processing sub-numbering occurs at the attentive level of processing. As such, respondents who are less motivated and less willing to devote attention and effort to processing will not use this information as much as

respondents who are more motivated. Therefore, I hypothesize that using sub-numbering for the follow-up questions will reduce skip errors further for the more motivated respondents compared to the less motivated respondents (H4.4).

For the combined forms, the multiple visual elements will build off each other and thus create even greater effects for respondents of differing motivation levels. Because enclosure is identified during the first stage of visual processing and indentation is identified during the second stage of visual processing, these elements will provide continuing reinforcement during pre-attentive processing. These continuous cues will further assist respondents when navigating the questionnaire, and because they are identified subconsciously, they will not require extra effort by the less motivated respondents. Therefore, I hypothesize that the combination form of enclosure and indentation will decrease skip errors further for respondents who are less motivated to complete the survey compared to respondents who are more motivated to complete the survey (H4.5).

The combination forms of enclosure and sub-numbering, indentation and sub-numbering, and enclosure, indentation and sub-numbering each include visual design elements that are hypothesized to have opposite effects (enclosure and indentation assist less motivated respondents further while sub-numbering assists more motivated respondents further). Because of these counteracting elements and the fact that the coefficients of the combinations of these visual design elements were not statistically significant in the overall models (see Chapter 2), I do not hypothesize any differential effects on the skip pattern error rates for combination forms featuring sub-numbering across respondents with differing levels of motivation.

4.3 Methods

The use of enclosure, proximity, and similarity to try to improve skip patterns for respondents with varying levels of motivation is examined using data from two experiments. The first experiment was implemented in an eight-page mail survey (labor survey) conducted by the Bureau of Sociological Research at the University of Nebraska-Lincoln (UNL) for the Nebraska Department of Economic Development (NDED). The second experiment was embedded in a four-page mail survey (UNL survey) developed and fielded by the author primarily for the purpose of this research.[1]

Both experiments had a control treatment featuring the detection method from Redline and colleagues (2003) (see Figure 2.3, Form 1 and Figure 2.4, Form 1 in Chapter 2). The other forms (seven for the labor survey and three for the UNL survey) incorporated enclosure, proximity, and similarity to examine the effectiveness of visually grouping the follow-up questions through these different principles. Both the labor and UNL surveys examine the enclosure and proximity principles by testing grouping the follow-up questions through separate background area (enclosure—see Figures 2.3 and 2.4 Form 2 in Chapter 2) and indentation (proximity—see Figures 2.3 and 2.4, Form 3 in Chapter 2). Additionally, both surveys examine the combination of these two (see Figure 2.5, Form 5 and Figure 2.4, Form 4 in Chapter 2). The labor survey also examined the effects of subgrouping through the use of sub-numbering (similarity) both singularly (see Figure 2.3, Form 4 in Chapter 2) and in combination with the other elements (see Figure 2.5, Forms 6, 7, and 8 in Chapter 2).

In all cases, visual design features are used to create stronger sub-grouping

[1]More information about the UNL and labor surveys can be found in Chapters 1 and 2 of this dissertation.

within the skip pattern. The intent is that those questions with the different visual element(s) (i.e., the follow-up questions) will be perceived as part of a group and different from questions without the visual element(s) (i.e., the filter questions and subsequent questions everyone answers). Using these elements may help respondents understand that the follow-up questions belong to a separate group from the filter question and should only be answered if respondents meet certain criteria.

4.3.1 Labor Survey

Sample members from Northeastern Nebraska were randomly selected and assigned to one of the eight experimental treatments (see Appendices B-I for the full questionnaires for the labor survey) in which the content of the questionnaire was held constant but the design of skip instructions was altered. With a sample size of 12,000 each of the eight experimental treatments was sent to 1,500 households. Response rates (AAPOR RR1) by experimental treatments ranged from 24.8% to 28.1% and do not significantly differ across treatments (χ^2=6.46, p=0.49; see Table 2.1 in Chapter 2). Additionally, the percent of respondents for each level of the two motivation proxies (number of contacts and topic salience—defined in section 4.3.4 below) do not differ across each of the treatments (see Table 4.1).

4.3.2 UNL Survey

The UNL survey had a smaller sample size of 3,000 respondents from across the entire state of Nebraska. The households were drawn from the USPS Computerized Delivery Sequence File (CDSF) using a stratified simple random sample with proportionate allocation. There were two strata, one for respondents living in a

Table 4.1: Percent of respondents in each level of motivation proxies by experimental treatment for the labor survey

	Number of Contacts		**Topic Salience**	
Treatment	**Early**	**Late**	**High**	**Low**
Control Form:				
No Added Elements	62.2%	37.8%	64.9%	35.1%
Enclosure Only	60.2%	39.8%	68.6%	31.4%
Indentation Only	65.9%	34.1%	67.0%	33.0%
Sub-Numbering Only	59.2%	40.8%	62.9%	37.1%
Enclosure * Indentation	66.4%	33.6%	69.7%	30.3%
Enclosure * Sub-Numbering	64.0%	36.0%	68.1%	31.9%
Indentation * Sub-Numbering	62.4%	37.6%	69.3%	30.7%
Enclosure * Indentation * Sub-Numbering	64.1%	35.9%	67.8%	32.2%
Overall	**63.1%**	**36.9%**	**67.3%**	**32.7%**
	$\chi^2 = 7.19$, p = 0.41		$\chi^2 = 6.04$, p = 0.54	

county in southeast Nebraska near UNL[2] and another for respondents living in the rest of the state.

Each sample household was randomly assigned to one of four experimental forms (see Appendices J-M for the full questionnaires for the UNL survey), resulting in a sample size of 750 per experimental treatment. Response rates (AAPOR RR1) by treatment ranged from 35.6% to 36.4%, and are not significantly different across all treatments (χ^2=0.12, p=0.99; see Table 2.2 in Chapter 2). Additionally, the percent of respondents for each level of the two motivation proxies (number of contacts and topic salience—defined in section 4.3.4 below) do not differ

[2]The counties located in southeast Nebraska near UNL are Butler, Cass, Dodge, Douglas, Fillmore, Gage, Jefferson, Johnson, Lancaster, Nemaha, Otoe, Pawnee, Polk, Richardson, Saline, Sarpy, Saunders, Seward, Thayer, Washington, and York.

across each of the treatments (see Table 4.2).

Table 4.2: Percent of respondents in each level of motivation proxies by experimental treatment for the UNL survey

	Number of Contacts		**Topic Salience**	
Treatment	**Early**	**Late**	**High**	**Low**
Control Form:				
No Added Elements	40.0%	60.0%	65.9%	34.1%
Enclosure Only	36.0%	64.0%	66.9%	33.1%
Indentation Only	41.9%	58.1%	67.3%	32.7%
Enclosure * Indentation	39.9%	60.1%	65.9%	34.1%
Overall	**39.5%**	**60.5%**	**66.5%**	**33.5%**
	$\chi^2 = 2.09$, p = 0.55		$\chi^2 = 0.17$, p = 0.98	

4.3.3 Measuring Skip Errors

This chapter uses the same indicator variables for skip pattern errors as used in Chapters 2 and 3. Specifically, the filter question outcome indicator is a binomial variable capturing whether respondents skipped (1) or answered the filter question (0). The follow-up question outcome indicator is a multinomial variable indicating if the respondent had omission errors (1), commission errors (2), or no errors on the follow-up questions (0). These indicator variables can take on a missing value if the respondent was not eligible to have an error for that skip pattern (see Chapter 2 for more detail).

4.3.4 Measuring Motivation

To measure motivation, this study uses two proxies consistent with previous research: number of contacts required to get a response and topic salience (Groves

et al., 2000, 2004; Stern et al., 2012; Smyth et al., 2009; Olson, 2013). For the number of contacts required before the completed survey is returned, respondents in both surveys could have received up to three questionnaires. Therefore, early responders (coded as 0) are considered to be those who returned the survey after receiving the first questionnaire mailing, while those who returned it after receiving the second or third questionnaire (i.e., the follow-up mailings) are considered late responders (coded as 1).

The second proxy for motivation is topic salience. For the labor survey, the respondents' employment status was used as the measure of topic salience because the majority of questions in the survey were relevant to those who are employed or are looking to reenter the workforce. Therefore, respondents who say they are employed or are likely to reenter the workforce are expected to already be motivated to respond (coded as 0), and respond accurately, based on the topic of the survey—specifically its relevance to their current employment status and goals (Groves et al., 2000; Dillman et al., 2014; Stern et al., 2012). On the other hand, respondents who are not employed and not likely to reenter the workforce are expected to be less motivated (coded as 1) and therefore less inclined to respond accurately as the survey is not focused on their current employment status and goals.

Three questions were asked in the labor survey about the respondents' employment status and goals. The first question asked if they were currently employed, unemployed, retired, or a homemaker (Appendix B: Question 1). The second question asked of those who were not currently employed if they were looking to reenter the workforce (Appendix B: Question 13). The third question asked both employed respondents and respondents who are looking to reenter the workforce how likely or unlikely they are to change jobs or reenter the workforce in

the next year (Appendix B: Question 31). I used responses from these three questions to classify the respondents into two motivational groups (more motivated and less motivated respondents). Table 4.3 shows how the responses to each of these questions maps to the motivation groups.[3]

The UNL survey asked questions about the respondents' opinions and connections with the University of Nebraska—Lincoln (UNL). This connection with UNL is hypothesized to be based on the respondents' location in the state. Respondents who live closer to UNL are thought to have a stronger connection with the university because they can easily travel to the university and news about the university is considered local news. Respondents living elsewhere in the state are hypothesized to have a weaker connection with the university because it takes more effort to hear about and travel to the university. Therefore, to measure the motivation proxy of topic salience, the UNL survey used the mailing address for the respondent. Specifically, respondents living in Southeast Nebraska (i.e., near UNL) are considered more motivated than respondents living elsewhere in the state. To measure this, I used the respondents' zip code. Any zip code within counties in Southeast Nebraska[4] were considered close to UNL.

4.3.5 Analysis Methods

To test these hypotheses about differential effects for respondents with different levels of motivation, I first conduct a bivariate analysis looking at the overall

[3]Respondents who selected opposite options to the questions asking if they were looking to reenter the workforce and their likelihood to reenter the workforce were classified as missing for this motivation proxy due to the discrepancy in their data. 50 (1.7%) respondents were classified as such. Additionally, there were 114 (3.8%) respondents who had either missing data for the employment status question or missing data for both the looking to reenter and the likelihood of change or reenter questions.

[4]Butler, Cass, Dodge, Douglas, Fillmore, Gage, Jefferson, Johnson, Lancaster, Nemaha, Otoe, Pawnee, Polk, Richardson, Saline, Sarpy, Saunders, Seward, Thayer, Washington, York

Table 4.3: Motivation classification for topic salience proxy based on respondent answers to three questions in the Labor survey

Employment Status	**Looking to Reenter**	**Likelihood of change or reenter**	**Motivation Classification**	**Percent of Respondents**
Employed	—	Any response	More Motivated	60.6%
Unemployed, Retired, Homemaker	Yes	Very Likely, Likely	More Motivated	2.8%
Unemployed, Retired, Homemaker	Yes	—	More Motivated	0.1%
Unemployed, Retired, Homemaker	—	Very Likely, Likely	More Motivated	0.2%
Unemployed, Retired, Homemaker	No	Very unlikely, Unlikely, Neutral	Less Motivated	1.4%
Unemployed, Retired, Homemaker	—	Very unlikely, Unlikely, Neutral	Less Motivated	29.0%
Unemployed, Retired, Homemaker	No	—	Less Motivated	0.5%

Note: "—" refers to missing data for that question

proportion of skip patterns in which each type of error was made across motivation levels. To calculate the proportions, I divide the total number of occurrences of the error type by the total number of opportunities (skip patterns) across respondents with each motivation level,

$$p_k = \frac{\sum_{j=1}^{n_k} \sum_{i=1}^{s} error_{ij}}{n_k * s} \tag{4.1}$$

where p_k is the proportion of errors for motivation proxy k, $error_{ij}$ is the indicator of whether respondent j made a skip error on skip pattern i, n_k is the total number of respondents with motivation proxy k, and s is the total number of skip pattern occurrences. I test for significant differences between motivation levels using t-tests. This bivariate analysis allows me to understand if respondents with lower motivation have more errors than respondents with higher motivation overall.

For the second analysis, I delve further into these error sources by incorporating both the experimental treatment and the motivation proxies in multilevel multivariate regression models, which adjust for the respondent variance. These models include the motivation proxy measures as both main effects and interactive effects with the visual design treatments. This interaction between the motivation proxies and the visual design elements will allow me to understand the differential effects for respondents with differing motivation levels for each element and combination of elements. Because chapter 2 of this dissertation found that the coefficients of the combination forms of enclosure and indentation with sub-numbering were not statistically significant in the overall models and I do not hypothesize any differences for the combination forms with sub-numbering, the models estimated will not include these interaction effects.

A multilevel logistic model, where skip patterns are nested within respondents, is used to predict the probability respondents will have item nonresponse to the filter question based on their motivation level and the visual elements they received on the survey (Equation 4.2). In this model, i represents the skip pattern, j represents the respondent, $error_{ij}$ is an indicator of whether respondent j had item nonresponse for skip pattern i, and u_j is the random intercept coefficient for respondent j. Additionally, the model contains indicators for whether the form respondent j was assigned contained enclosure ($Enclosure_j$), indentation ($Indentation_j$), or sub-numbering ($SubNumbering_j$), as well as whether the topic is less salient for respondent j ($TopicSaliency_j$) or whether they are a late responder ($Late_j$).

Equation 4.2 is the full model for the topic saliency interactions in the labor survey. The model for number of contacts replaces $TopicSaliency_j$ in the interaction terms with $Late_j$. The UNL models are the same as Equation 4.2, with the exception of the indicator for sub-numbering. The UNL survey did not contain the sub-numbering experiment. The analysis of all models includes examining first the main effects then adding in the interaction terms. I estimate four models, two for the labor survey and two models for the UNL survey to incorporate the interactions individually. By building the models in this manner, I can gain insight into both the main effects of the motivation proxies as well whether motivation modifies the effect of the visual design elements.

$$
\begin{aligned}
logit(Error_{ij}) = u_j + \alpha + \beta_1 Enclosure_j + \beta_2 Indentation_j \\
+ \beta_3 SubNumbering_j + \beta_4 Enclosure_j Indentation_j \\
\\
+ \beta_5 TopicSalience_j \\
+ \beta_6 Late_j \\
\\
+ \beta_7 Enclosure_j TopicSalience_j \\
+ \beta_8 Indentation_j TopicSalience_j \\
+ \beta_9 SubNumbering_j TopicSalience_j \\
+ \beta_{10} Enclosure_j Indentation_j TopicSalience_j \\
+ \varepsilon_{ij}
\end{aligned}
\tag{4.2}
$$

I also use multilevel multinomial models where skip patterns are nested within respondents to predict the probability that respondents will have omission or commission errors based on their level of motivation and the visual elements they received on the survey (Equation 4.3). The indicators of visual design elements and respondent motivation are the same as in equation 4.2. However, the models for the omission and commission errors are multinomial models instead of logistic models to measure the probability respondents have either omission or commission errors compared to no errors on the follow-up questions. Therefore, in this equation, k represents the error type (omission, commission, no error) such that $error_{ijk}$ is an indicator of whether respondent j had error k for skip pattern i, u_{jk} is the random intercept coefficient for respondent j and error k, α_k is the intercept coefficient for error k, and β_k's are the coefficients for each independent variable for each error k.

$$
\begin{aligned}
logit(Error_{ijk}) = {} & u_{jk} + \alpha_k + \beta_{1k}Enclosure_j + \beta_{2k}Indentation_j \\
& + \beta_{3k}SubNumbering_j + \beta_{4k}Enclosure_jIndentation_j \\
& \\
& + \beta_{5k}TopicSalience_j \\
& + \beta_{6k}Late_j \\
& \\
& + \beta_{7k}Enclosure_jTopicSalience_j \\
& + \beta_{8k}Indentation_jTopicSalience_j \\
& + \beta_{9k}SubNumbering_jTopicSalience_j \\
& + \beta_{10k}Enclosure_jIndentation_jTopicSalience_j \\
& + \varepsilon_{ijk}
\end{aligned}
\tag{4.3}
$$

As with the models for item nonresponse to the filter questions, I first examine the main effects and then add in the interactions for each motivation proxy. By building the models in this manner, I can gain insight into both the main effects of the motivation proxies as well whether motivation modifies the effect of the visual design elements.

4.4 **Results**

4.4.1 Item Nonresponse on the Filter Question

Analysis 1: Overall Effects

First, I examine the rate of item nonresponse to the filter question for respondents with each level of motivation (Table 4.4). We see that respondents for whom the topic is less salient and require more contact attempts before responding had higher item nonresponse rates to the filter question in both surveys compared to their more motivated counterparts. For example, late responders had item nonresponse on 5.5% of skip pattern filter questions in the labor survey compared to early responders who had item nonresponse on 4.5% of skip pattern filter questions. Both

motivation proxies have significantly different rates of item nonresponse to the filter question in the labor survey, but only the difference in item nonresponse to the filter question between late and early respondents is statistically significant in the UNL survey. Even with this, the trend still holds and these results support hypothesis H4.1 which states that less motivated respondents will have higher rates of item nonresponse to the filter question.

Table 4.4: Percent of skip patterns where respondents of different motivation levels have item nonresponse to the filter question for the Labor and UNL surveys overall

Motivation Proxy	**Labor Survey**		**UNL Survey**	
Late	5.5%	t = -3.38,	1.4%	t = -2.14,
Early	4.5%	p < 0.001	0.9%	p = 0.03
Low Saliency	4.9%	t = -2.69,	1.4%	t = -1.07,
High Saliency	4.1%	p = 0.01	1.1%	p = 0.28

Analysis 2: Multivariate Analysis

The next step is to account for the experimental treatments by modeling item nonresponse rates on the filter question in the multilevel logistic model defined in Equation 4.2. First, I look at the multilevel logistic model for the main effects only (Labor: Table 4.5; UNL: Table 4.6). In both surveys, late responders and those for whom the topic is less salient had higher odds of having item nonresponse to the filter question compared to their counterparts. Although these coefficients were only statistically significant in the labor survey, this trend indicates partial support for hypothesis H4.1 that less motivated respondents have higher rates of item nonresponse to the filter question compared to more motivated respondents.

Table 4.5: Odds ratios for the multilevel logistic regression predicting the probability respondents with different levels of motivation have item nonresponse on the filter question for the Labor survey

Parameter	**Main Effects**
Intercept	0.008* (0.006, 0.011)
Enclosure	1.032 (0.844, 1.260)
Indentation	0.973 (0.797, 1.189)
Sub-Numbering	1.447* (1.183, 1.771)
Low Saliency	1.834* (1.416, 2.374)
Late	1.303* (1.061, 1.600)
Respondent Variance	2.7241
ICC	0.4530
-2*Log-Likelihood	7642.17
AIC	7656.17

n = 21,994

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high topic saliency, and returned the survey after only the first mailing.

To assess whether the visual design elements had different effects for respondents with different motivation levels, I incorporate the two-way and then three-way interaction terms into the models (Labor: Table 4.7; UNL: Table 4.8). There are no statistically significant differences in the rate of item nonresponse to the filter question for early and late responders for either the labor or UNL survey. However, there are statistical differences in the rate of item nonresponse to the filter question for topic saliency in the labor survey. The two-way interaction model for the labor survey indicates that enclosure differentially affects the rate of item nonresponse to the filter question for respondents with different topic saliency levels. Specifically, using separate enclosure to group the follow-up questions

Table 4.6: Odds ratios for the multilevel logistic regression predicting the probability respondents with different levels of motivation have item nonresponse on the filter question for the UNL survey

Parameter	**Main Effects**
Intercept	0.000* (0.000, 0.001)
Enclosure	0.847 (0.331, 2.166)
Indentation	0.625 (0.241, 1.623)
Low Saliency	1.004 (0.372, 2.709)
Late	1.373 (0.510, 3.700)
Respondent Variance	30.1953
ICC	0.9018
-2*Log-Likelihood	921.01
AIC	933.01

n = 8,364

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high topic saliency, and returned the survey after only the first mailing.

increases the item nonresponse rate for the filter question for respondents for whom the topic is less salient in the labor survey (Figure 4.1) compared to no added elements. We also see that the separate enclosure of the follow-up items assists respondents for whom the topic is more salient compared to no added elements. This means that using separate enclosure to group the follow-up questions decreased item nonresponse to the filter question further for more motivated respondents compared to less motivated respondents. This is contrary to hypothesis H4.2.

Table 4.7: Odds ratios for the multilevel logistic regression with interaction effects predicting the probability respondents with different levels of motivation have item nonresponse on the filter question for the Labor survey

Parameter	2-way Interactions		3-way Interactions	
	Low Saliency	Late	Low Saliency	Late
Intercept	0.011* (0.007, 0.018)	0.007* (0.005, 0.010)	0.009* (0.005, 0.016)	0.007* (0.005, 0.011)
Enclosure	0.734 (0.441, 1.221)	1.221 (0.875, 1.703)	1.028 (0.541, 1.956)	1.101 (0.759, 1.598)
Indentation	0.809 (0.490, 1.337)	1.244 (0.897, 1.725)	1.113 (0.596, 2.080)	1.127 (0.783, 1.621)
Sub-Numbering	1.310 (0.820, 2.093)	1.441* (1.115, 1.863)	1.320 (0.825, 2.114)	1.440* (1.114, 1.861)
Enclosure * Indentation	0.798 (0.534, 1.193)	0.802 (0.537, 1.199)	0.371* (0.140, 0.987)	0.974 (0.584, 1.626)
Low Saliency	1.125 (0.672, 1.883)	1.840* (1.421, 2.383)	1.401 (0.784, 2.504)	1.849* (1.428, 2.395)
Late	1.303* (1.061, 1.600)	1.654* (1.084, 2.523)	1.299* (1.058, 1.596)	1.453 (0.907, 2.328)
Enclosure * Saliency	1.734* (1.024, 2.935)		1.140 (0.557, 2.332)	
Indentation * Saliency	1.421 (0.843, 2.398)		0.952 (0.473, 1.917)	
Sub-Numbering * Saliency	1.137 (0.677, 1.910)		1.127 (0.669, 1.896)	
Enclosure * Indentation * Saliency			2.526 (0.864, 7.390)	
Enclosure * Late		0.857 (0.568, 1.294)		1.093 (0.615, 1.944)
Indentation * Late		0.701 (0.464, 1.059)		0.894 (0.503, 1.587)
Sub-Numbering * Late		1.018 (0.673, 1.538)		1.024 (0.677, 1.547)
Enclosure * Indentation * Late				0.608 (0.266, 1.388)
Respondent Variance	2.7115	2.7161	2.7099	2.7134
ICC	0.4518	0.4522	0.4517	0.4520
-2*Log-Likelihood	7635.40	7637.92	7632.50	7636.58
AIC	7657.40	7659.92	7656.50	7660.58

n = 21,994

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high topic saliency, and returned the survey after only the first mailing.

Table 4.8: Odds ratios for the multilevel logistic regression with interaction effects predicting the probability respondents with different levels of motivation have item nonresponse on the filter question for the UNL survey

Parameter	2-way Interactions				3-way Interactions			
	Low Saliency		Late		Low Saliency		Late	
Intercept	0.000*	(0.000, 0.001)	0.000*	(0.000, 0.001)	0.000*	(0.000, 0.001)	0.000*	(0.000, 0.001)
Enclosure	1.386	(0.330, 5.827)	1.240	(0.191, 8.069)	1.343	(0.290, 6.221)	0.901	(0.093, 8.740)
Indentation	0.944	(0.204, 4.367)	1.108	(0.172, 7.146)	0.910	(0.173, 4.772)	0.812	(0.086, 7.636)
Enclosure * Indentation	0.639	(0.091, 4.485)	0.689	(0.099, 4.769)	0.687	(0.069, 6.814)	1.300	(0.053, 31.909)
Low Saliency	1.960	(0.405, 9.487)	1.022	(0.380, 2.751)	1.883	(0.338, 10.501)	1.026	(0.382, 2.758)
Late	1.378	(0.514, 3.696)	2.124	(0.394, 11.436)	1.379	(0.514, 3.701)	1.706	(0.269, 10.815)
Enclosure * Saliency	0.382	(0.049, 3.011)			0.417	(0.033, 5.319)		
Indentation * Saliency	0.532	(0.065, 4.368)			0.585	(0.041, 8.342)		
Enclosure * Indentation * Saliency					0.774	(0.010, 61.967)		
Enclosure * Late			0.699	(0.095, 5.157)			1.093	(0.074, 16.077)
Indentation * Late			0.536	(0.072, 4.003)			0.857	(0.055, 13.324)
Enclosure * Indentation * Late							0.365	(0.006, 20.728)
Respondent Variance	29.0554		29.6924		29.0535		29.4848	
ICC	0.8983		0.9003		0.8983		0.8996	
-2*Log-Likelihood	919.77		920.43		919.76		920.19	
AIC	937.77		938.43		939.76		940.19	

n = 8,364

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high topic saliency, and returned the survey after only the first mailing.

Figure 4.1: Predicted percentage of item nonresponse to the filter question for enclosure and topic saliency for the labor survey

None of the other interaction terms are statistically significant in the models, indicating that there are no additional differential effects for respondents with different levels of motivation (no support for hypotheses H4.3-H4.5). This means that less motivated respondents do not utilize these elements more than more motivated respondents when navigating the filter question.

Summary of Hypothesis Findings for Item Nonresponse on the Filter

Results from both experiments indicate a trend that less motivated respondents have higher item nonresponse rates to the filter question compared to more motivated respondents (hypothesis H4.1). In the overall analysis (analysis 1), both proxies of motivation were statistically significant in the labor survey and the topic salience proxy was statistically significant in the UNL survey. However, when using a model which accounts for clustering of items within respondents and the visual

design elements, the coefficients for the motivation proxies in the labor survey model were statistically significant but the coefficients for the motivation proxies in the UNL survey were not.

When looking at the interaction terms in the multivariate models, there was only one significant coefficient: the interaction of enclosure and topic saliency in the Labor survey. These results indicate that the inclusion of separate enclosure decreased the probability that more motivated respondents had item nonresponse to the filter question, but increased the probability that less motivated respondents had item nonresponse to the filter question. This is contrary to the hypothesis that enclosure would decrease error rates further for less motivated respondents compared to more motivated respondents (H4.2).

The results of these experiments also indicate that the visual grouping treatments of indentation, sub-numbering, and the combination of enclosure and indentation have no differential effects on the probability of item nonresponse to the filter question for respondents with different levels of motivation (hypotheses H4.3-H4.5). This means that these added visual design elements do not increase or decrease rates of item nonresponse to the filter question further for less motivated respondents compared to more motivated respondents.

4.4.2 Omission and Commission Errors

Analysis 1: Overall Effects

Moving to omission and commission errors, I first examine the percent of skip patterns where respondents had omission and commission errors on the follow-up questions for each motivation proxy (Tables 4.9 and 4.10). First looking at the rate of omission errors, we see a trend that late respondents had higher rates of omission errors compared to early respondents, but that respondents for whom the topic was

less salient had lower rates of omission errors compared to those for whom the topic was more salient. However, these differences are only statistically significant for the early and late respondents in the UNL survey. These results only partially support the hypothesis that less motivated respondents will have higher rates of error compared to more motivated respondents (H4.1).

Looking at the rate of commission errors, we see a consistent trend in that the less motivated respondents (late responders and low saliency) have higher rates of commission errors compared to more motivated respondents. These findings are statistically significant for both proxies in the labor survey, and for the number of contacts proxy in the UNL survey. These results support hypothesis H4.1.

Table 4.9: Percent of skip patterns where respondents of different motivation levels had omission and commission errors on follow-up questions for the Labor survey overall

Motivation Proxy	**Omission Errors**		**Commission Errors**	
Late	0.8%	t = -1.34	10.0%	t = -2.20,
Early	0.6%	p = 0.18	9.1%	p = 0.03
Low Saliency	0.6%	t = 0.83,	11.3%	t = -5.73,
High Saliency	0.7%	p = 0.41	8.5%	p < 0.001

Analysis 2: Multivariate Analysis

The next step is to account for the experimental treatments by modeling omission and commission errors in the multilevel multinomial model defined in Equation 4.3. First, I look at the model for the main effects only (Labor: Table 4.11; UNL: Table 4.12. The coefficients for saliency and number of contacts are not statistically significant in either survey for both omission and commission errors. This means that less motivated respondents had statistically the same probabilities of having

Table 4.10: Percent of skip patterns where respondents of different motivation levels had omission and commission errors on the follow-up questions for the UNL survey overall

Motivation Proxy	**Omission Errors**		**Commission Errors**	
Late	2.6%	t = -2.08,	2.8%	t = -2.41
Early	2.0%	p = 0.04	2.0%	p = 0.02
Low Saliency	2.2%	t = 0.57,	2.8%	t = -1.36,
High Saliency	2.5%	p = 0.57	2.3%	p = 0.17

omission and commission errors compared to more motivated respondents (no support for hypothesis H4.1).

Table 4.11: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different motivation levels have omission and commission errors on follow-up questions for Labor survey

Parameter	**Omission Errors**		**Commission Errors**	
Intercept	0.004*	(0.002, 0.007)	0.105*	(0.092, 0.120)
Enclosure	0.792	(0.559, 1.122)	0.804*	(0.731, 0.883)
Indentation	1.379	(0.971, 1.958)	0.959	(0.873, 1.053)
Sub-Numbering	1.184	(0.837, 1.676)	0.975	(0.888, 1.071)
Low Saliency	1.504	(0.956, 2.366)	1.100	(0.983, 1.230)
Late	1.189	(0.835, 1.694)	1.092	(0.992, 1.203)
Respondent Variance	1.0259		0.0000	
ICC	0.2377		0.0000	
-2*Log Pseudo-Likelihood	226996.2			

n = 20,979

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high saliency, and returned the survey after only the first mailing.

Table 4.12: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different motivation levels have omission and commission errors on follow-up questions for UNL survey

Parameter	Omission Errors		Commission Errors	
Intercept	0.009*	(0.005, 0.015)	0.006*	(0.003, 0.011)
Enclosure	0.755	(0.536, 1.064)	0.719	(0.483, 1.072)
Indentation	1.713*	(1.211, 2.425)	1.302	(0.874, 1.939)
Low Saliency	0.919	(0.637, 1.325)	1.296	(0.858, 1.958)
Late	1.426	(0.996, 2.044)	1.389	(0.917, 2.103)
Respondent Variance	1.2551		1.7795	
ICC	0.2762		0.3510	
-2*Log-Likelihood	3621.75			
AIC	3645.75			

n = 8,266

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high saliency, and returned the survey after only the first mailing.

To assess the impact of the visual design elements on the level of motivation, I incorporate the two-way and then three-way interaction terms into the models (Labor: Saliency-Table 4.13, Contacts-Table 4.14; UNL: Saliency-Table 4.15, Contacts-Table 4.16). Across all models, none of the interaction terms are statistically significant. This means that less motivated respondents are not more affected by the visual design elements than more motivated respondents when navigating the follow-up questions. These results indicate no support for hypotheses focusing on these differential effects (H4.2-H4.5).

Table 4.13: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability respondents with different levels of topic saliency in the survey have omission and commission errors on follow-up questions for Labor survey

	Low Saliency: 2-way Interactions				**Low Saliency: 3-way Interaction**			
	Omission		**Commission**		**Omission**		**Commission**	
Parameter	**Errors**		**Errors**		**Errors**		**Errors**	
Intercept	0.004*	(0.002, 0.011)	0.099*	(0.081, 0.121)	0.004*	(0.001, 0.011)	0.100*	(0.080, 0.124)
Enclosure	0.470	(0.169, 1.311)	0.889	(0.714, 1.107)	0.703	(0.154, 3.213)	0.876	(0.666, 1.153)
Indentation	2.235	(0.880, 5.678)	0.979	(0.790, 1.214)	2.758	(0.873, 8.709)	0.966	(0.742, 1.258)
Sub-Numbering	0.784	(0.339, 1.814)	1.094	(0.898, 1.333)	0.783	(0.338, 1.812)	1.094	(0.898, 1.334)
Enclosure * Indentation	0.981	(0.480, 2.002)	0.781*	(0.646, 0.944)	0.532	(0.079, 3.574)	0.806	(0.540, 1.204)
Low Saliency	1.325	(0.504, 3.485)	1.109	(0.890, 1.383)	1.587	(0.507, 4.969)	1.099	(0.862, 1.402)
Late	1.189	(0.835, 1.695)	1.094	(0.993, 1.205)	1.188	(0.834, 1.693)	1.094	(0.993, 1.205)
Enclosure * Saliency	1.908	(0.712, 5.107)	1.023	(0.815, 1.284)	1.208	(0.238, 6.132)	1.043	(0.762, 1.427)
Indentation * Saliency	0.566	(0.211, 1.519)	1.122	(0.895, 1.406)	0.438	(0.124, 1.551)	1.142	(0.845, 1.542)
Sub-Numbering * Saliency	1.657	(0.658, 4.170)	0.862	(0.689, 1.079)	1.659	(0.659, 4.177)	0.862	(0.689, 1.079)
Enclosure * Indentation * Saliency					2.035	(0.261, 15.884)	0.960	(0.609, 1.513)
Respondent Variance	1.0199		0.0000		1.0204		0.0000	
ICC	0.2366		0.0000		0.2367		0.0000	
-2*Log Pseudo-Likelihood	227758.0				227692.2			

n = 20,979

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high saliency, and returned the survey after only the first mailing.

Table 4.14: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability early and late respondents have omission and commission errors on follow-up questions for Labor survey

	Late: 2-way Interactions				**Late: 3-way Interaction**			
	Omission		**Commission**		**Omission**		**Commission**	
Parameter	**Errors**		**Errors**		**Errors**		**Errors**	
Intercept	0.004*	(0.002, 0.007)	0.099*	(0.085, 0.116)	0.004*	(0.002, 0.008)	0.100*	(0.085, 0.117)
Enclosure	1.049	(0.552, 1.995)	0.911	(0.782, 1.062)	0.778	(0.368, 1.644)	0.901	(0.760, 1.069)
Indentation	1.864*	(1.035, 3.355)	1.087	(0.938, 1.258)	1.489	(0.787, 2.816)	1.076	(0.916, 1.264)
Sub-Numbering	0.904	(0.579, 1.411)	0.955	(0.848, 1.076)	0.906	(0.580, 1.416)	0.955	(0.848, 1.076)
Enclosure * Indentation	0.848	(0.412, 1.744)	0.780*	(0.645, 0.942)	1.350	(0.532, 3.426)	0.797	(0.627, 1.012)
Low Saliency	1.492	(0.947, 2.349)	1.102	(0.985, 1.233)	1.496	(0.950, 2.357)	1.103	(0.985, 1.233)
Late	1.329	(0.615, 2.875)	1.086	(0.897, 1.315)	0.993	(0.422, 2.333)	1.071	(0.866, 1.325)
Enclosure * Late	0.632	(0.303, 1.317)	0.993	(0.817, 1.207)	1.182	(0.403, 3.465)	1.021	(0.779, 1.338)
Indentation * Late	0.557	(0.269, 1.154)	0.961	(0.792, 1.168)	0.907	(0.352, 2.338)	0.986	(0.760, 1.279)
Sub-Numbering * Late	2.051	(0.985, 4.274)	1.058	(0.872, 1.284)	2.067	(0.992, 4.310)	1.058	(0.872, 1.285)
Enclosure * Indentation * Late					0.306	(0.068, 1.372)	0.945	(0.639, 1.396)
Respondent Variance	1.0169		0.0000		1.0156		0.0000	
ICC	0.2361		0.0000		0.2359		0.0000	
-2*Log Pseudo-Likelihood	227784.5				228006.9			

n = 20,979

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high saliency, and returned the survey after only the first mailing.

Table 4.15: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability respondents with different levels of topic saliency have omission and commission errors on follow-up questions for the UNL survey

	Low Saliency: 2-way Interactions		**Low Saliency: 3-way Interaction**	
	Omission	**Commission**	**Omission**	**Commission**
Parameter	**Errors**	**Errors**	**Errors**	**Errors**
Intercept	0.008* (0.004, 0.014)	0.005* (0.002, 0.010)	0.008* (0.004, 0.015)	0.005* (0.003, 0.011)
Enclosure	0.927 (0.516, 1.667)	0.860 (0.442, 1.671)	0.850 (0.442, 1.633)	0.703 (0.333, 1.484)
Indentation	2.092* (1.220, 3.586)	1.899* (1.020, 3.533)	1.948* (1.087, 3.490)	1.609 (0.820, 3.159)
Enclosure * Indentation	0.772 (0.385, 1.547)	0.616 (0.277, 1.369)	0.894 (0.384, 2.085)	0.889 (0.326, 2.427)
Low Saliency	1.138 (0.589, 2.196)	1.453 (0.706, 2.990)	1.007 (0.463, 2.189)	1.124 (0.483, 2.618)
Late	1.430 (0.998, 2.051)	1.409 (0.931, 2.134)	1.431 (0.999, 2.052)	1.420 (0.938, 2.150)
Enclosure * Saliency	0.847 (0.406, 1.766)	1.234 (0.540, 2.820)	1.093 (0.357, 3.347)	2.057 (0.626, 6.758)
Indentation * Saliency	0.789 (0.376, 1.655)	0.662 (0.290, 1.512)	0.972 (0.354, 2.666)	1.060 (0.339, 3.310)
Enclosure * Indentation * Saliency			0.638 (0.145, 2.813)	0.369 (0.070, 1.940)
Respondent Variance	1.2527	1.7635	1.2504	1.7562
ICC	0.2758	0.3490	0.2754	0.3480
-2*Log-Likelihood	3617.92		3616.18	
AIC	3653.92		3656.18	

n = 8,266

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high saliency, and returned the survey after only the first mailing.

Table 4.16: Odds ratios for the multilevel multinomial regression with interaction effects predicting the probability early and late respondents have omission and commission errors on follow-up questions for the UNL survey

	Late: 2-way Interactions				**Late: 3-way Interaction**			
	Omission		**Commission**		**Omission**		**Commission**	
Parameter	**Errors**		**Errors**		**Errors**		**Errors**	
Intercept	0.008*	(0.004, 0.016)	0.006*	(0.003, 0.013)	0.009*	(0.004, 0.018)	0.006*	(0.003, 0.013)
Enclosure	0.872	(0.422, 1.802)	0.635	(0.284, 1.420)	0.772	(0.298, 2.000)	0.716	(0.266, 1.926)
Indentation	2.026*	(1.034, 3.970)	1.501	(0.717, 3.141)	1.856	(0.839, 4.102)	1.643	(0.696, 3.877)
Enclosure * Indentation	0.778	(0.388, 1.562)	0.606	(0.272, 1.353)	0.947	(0.284, 3.161)	0.481	(0.121, 1.903)
Low Saliency	0.922	(0.639, 1.329)	1.308	(0.866, 1.975)	0.922	(0.639, 1.330)	1.304	(0.863, 1.970)
Late	1.487	(0.768, 2.879)	0.995	(0.484, 2.046)	1.367	(0.632, 2.955)	1.083	(0.473, 2.483)
Enclosure * Late	1.005	(0.488, 2.069)	1.816	(0.779, 4.232)	1.202	(0.381, 3.789)	1.509	(0.445, 5.115)
Indentation * Late	0.927	(0.444, 1.935)	1.149	(0.497, 2.654)	1.064	(0.395, 2.869)	0.988	(0.326, 2.995)
Enclosure * Indentation * Late					0.743	(0.169, 3.254)	1.421	(0.261, 7.734)
Respondent Variance	1.2535		1.7615		1.2527		1.7610	
ICC	0.2759		0.3487		0.2758		0.3487	
-2*Log-Likelihood	3617.72				3617.39			
AIC	3653.72				3657.39			

n = 8,266

Significance: * $p < 0.05$. Reference group is respondents who received the control form with no added visual design features, high saliency, and returned the survey after only the first mailing.

Summary of Hypothesis Findings for Omission and Commission Errors

The results from the overall analysis (analysis 1) indicate that there are some significant differences in the rates of omission and commission errors between less motivated and more motivated respondents. However, after using a model which accounts for the clustering of items within respondents and the visual design elements, these effects were no longer statistically significant. This means that respondents with different levels of motivation have the same rate of omission and commission errors (no support for hypothesis H4.1).

Looking at the results from the models with the interaction terms, it also appears that the visual grouping treatments have no differential effects on the probability of omission and commission errors on the follow-up questions for respondents with different motivation levels (Hypotheses H4.2-H4.5). Although these added elements do not decrease error rates further for less motivated respondents compared to more motivated respondents, it is important to note that when the visual design elements are present, the rates of error do not increase either.

4.5 **Conclusion**

There are three key findings from this study. First, less motivated respondents have higher rates of item nonresponse to the filter question compared to more motivated respondents. This finding corresponds to previous research on the topic which indicated that less motivated respondents had lower data quality (Stern et al., 2012; Smyth et al., 2009). However, there were no significant differences between less motivated and more motivated respondents for rates of omission and commission errors. The lack of significant differences for rates of omission and commission errors between the two motivations groups, and the fact that the rate

of omission errors was lower than commission errors (particularly in the labor survey), could indicate that less motivated respondents do not follow skip patterns and instead just answer every question they encounter on the page.

Second, using enclosure as a visual grouping mechanism in the labor survey increased item nonresponse to the filter question for respondents for whom the topic is less salient, but decreased item nonresponse to the filter question for respondents for whom the topic is more salient. This finding is contrary to what was hypothesized and was not supported in the UNL survey. One possible explanation for this contrary finding is that the added visual design element caused confusion for respondents who were already less willing to complete a complex survey task, while respondents who were already motivated to complete the survey took the time to understand and utilize the visual design elements. Another possible explanation is that the proxy used to determine topic salience in the labor survey was not a strong differentiator. For example, although not all respondents may be directly affected by the labor market, they may still be interested in the welfare of it, or they may fail to return the survey altogether. Additionally, I included respondents who are currently employed as being more interested in the survey, however, they may actually be less interested as they already have a job and thus less motivated to complete the survey. Future research should examine other surveys, and other proxies of motivation to better understand the relationship between enclosure, motivation, and skip errors.

Third, indentation, sub-numbering, and the combination of enclosure and indentation did not differentially assist respondents with different motivation levels on rates of item nonresponse to the filter question. Additionally, none of the visual design elements differentially assisted respondents with different motivation levels on rates of omission and commission errors. This means that less motivated

respondents and more motivated respondents utilized these visual design elements similarly. This is contrary to previous research which found that added visual design elements improved data quality for late responders (Stern et al., 2012; Smyth et al., 2009). However, the visual design change in these articles was focused on providing respondents with expectations of what they should answer, while the visual design change in this dissertation was focused on easing respondent burden. Therefore, more research should be done to better understand how visual design elements can be used to reduce respondent burden.

It is important to note that the final mailing in the UNL survey included an incentive. This means that respondents who returned the survey after receiving the incentive may have a higher level of motivation to complete the survey accurately due to the apparent social exchange with the researcher (Dillman et al., 2014). Although there are still fundamental differences in the characteristics of early and late responders, the addition of the incentive might mitigate the differences seen in the skip pattern error rates. However, since there were no differences in the error rates for the labor survey where the protocol did not change, more research should be done to better understand the effect of these visual design elements on skip errors for early and late responders.

Chapter 5: Conclusion

5.1 Overview

This dissertation examined visually grouping skip patterns in an effort to decrease skip errors. Three visual design elements were tested on the follow-up questions—separate enclosure, indentation, and sub-numbering—to determine their impact on rates of item nonresponse to the filter question, omission and commission errors. These visual design elements were implemented in two surveys: the labor survey and the UNL survey. The labor survey implemented all three visual design elements in a 2^3 factorial design resulting in eight forms tested, while the UNL survey only implemented separate enclosure and indentation in a 2^2 factorial design resulting in four forms. The full surveys for each experimental treatment are located in Appendices B-M.

The first chapter of this dissertation discussed the current literature on visual design and skip patterns and detailed the methods and hypotheses to be tested throughout this dissertation. The second chapter looked at the overall rates of error for each form to see if the visual design elements affected error rates for all respondents.

The third and fourth chapters examined the visual design elements further to see if respondents with different characteristics had different error rates. In the third chapter I looked at the respondents' linguistic ability to see if the visual design elements could decrease skip errors further for respondents with low linguistic ability compared to respondents with high linguistic ability. The fourth chapter examined the respondents' motivation level to see if the visual design elements could decrease skip errors further for respondents who are less motivated to complete the survey compared to respondents who are more motivated to

complete the survey.

This chapter summaries the key findings from this dissertation and provides an overall recommendation on the visual design elements researchers should use in their surveys. I conclude with limitations of this dissertation and future research that should be conducted to gain a better understanding of how visual design elements affect skip pattern errors.

5.2 **Key Findings**

5.2.1 Item Nonresponse to the Filter Question

Results from this dissertation indicate three main findings on rates of item nonresponse to the filter question. First, respondents with lower levels of cognitive ability and motivation have higher rates of item nonresponse compared to respondents with higher levels of cognitive ability and motivation. This finding adds to the existing literature which states that low cognitive ability respondents and less motivated respondents have more difficulty with complex survey tasks (Knauper, 1999; Knauper et al., 2007; Narayan and Krosnick, 1996; Krosnick et al., 1996; Stern et al., 2012; Smyth et al., 2009).

Second, looking across all respondents, using sub-numbering to visually group the items increases rates of item nonresponse. This could be due to the fact that sub-numbering is processed during attentive processing (Ware, 2012), and thus requires respondents to focus and analyze the sub-numbering to determine the correct navigation. As a result, respondents may be so focused on the sub-numbering that they forget to register an answer to the filter question. As neither enclosure nor indentation resulted in higher rates of item nonresponse to the filter question overall, one can argue that these elements are sub-consciously assisting respondents and therefore, not interfering with the response process.

Third, enclosure differentially affects the rates of item nonresponse to the filter question for respondents with different levels of topic saliency. Unfortunately, the differential effect is in the opposite direction of the hypothesis: using enclosure decreases rates of item nonresponse to the filter question for more motivated respondents, and increases rates of item nonresponse to the filter question for less motivated respondents. It is possible that the stark contrast in the separate background actually pulled the focus of less motivated respondents causing the page to appear more complex at first glance, thus resulting in higher rates of item nonresponse to the filter question as they were not motivated to attempt and complete the page. On the other hand, the fact that enclosure decreases item nonresponse for more motivated respondents indicates that it further assists respondents who already have lower error rates. Even though these more motivated respondents may not need the added visual design to increase their data quality, they are utilizing enclosure more efficiently than less motivated respondents. Researchers who survey a population where the topic is of high saliency to their respondents, can capitalize on this finding and use separate enclosure of the follow-up questions to reduce rates of item nonresponse to the filter question.

5.2.2 Omission Errors on the Follow-up Questions

There were two main findings on rates of omission errors on the follow-up questions. First, looking across all respondents, using indentation only to visually group the follow-up questions increases omission errors. Based on visual design theory, one can argue that the increased rate of omission errors could be due to the fact that the follow-up questions are now outside of the respondent's foveal view. This means that the follow-up questions go unseen and therefore unanswered. As there are no differences in error rates between the control form and when

indentation is combined with other elements, it is possible that the other visual design elements are helping to draw respondents attention to these questions. For example, using enclosure and indentation results in more blank, white space on the page. This lack of elements in contrast to the rest of the survey, helps move the respondent's gaze to the right bringing the follow-up questions into view.

Second, the visual design elements did not differentially affect the rates of omission errors for respondents with different levels of cognitive ability and motivation. This means that respondents of all cognitive abilities and motivation levels perceive and utilize the visual design elements similarly. While these results do not provide a clear best design to decrease omission errors for lower cognitive ability and motivation respondents, it is important to note that none of the visual design elements increased omission errors for these respondents.

5.2.3 Commission Errors on the Follow-up Questions

There were three main findings on rates of commission errors on the follow-up questions. First, respondents with lower levels of cognitive ability and motivation have higher rates of commission errors compared to respondents with higher levels of cognitive ability and motivation. As with the similar finding on rates of item nonresponse, this finding adds to the existing literature which states that low cognitive ability respondents and less motivated respondents have more difficulty with complex survey tasks (Knauper, 1999; Knauper et al., 2007; Narayan and Krosnick, 1996; Krosnick et al., 1996; Stern et al., 2012; Smyth et al., 2009).

Second, looking across all respondents, using enclosure only or the combination of enclosure and indentation to visually group the items decreases rates of commission errors. Because enclosure is seen during the first stage of the visual process, it is noticed and utilized without conscious analysis, thus it is an

effective visual grouping method on its own. When combined with indentation, the visual contrast between the follow-up questions and all other questions is more prominent leading to further decreased commission errors compared to enclosure alone.

Third, the visual design elements did not differentially affect the rates of commission errors for respondents with different levels of cognitive ability and motivation. This means that respondents of all cognitive abilities and motivation levels perceive and utilize the visual design elements similarly for commission errors. This finding is similar to the finding for omission error as even though these results do not provide a clear best design to decrease commission errors for lower cognitive ability and motivation respondents, none of the visual design elements increased commission errors for these respondents.

5.3 **Overall Recommendations and Implications**

Based on these results, I conclude that the combination of enclosure and indentation is the best treatment tested in this dissertation. Therefore, this combination is the visual design format I recommend researchers use in their surveys. Enclosure and indentation had the lowest rates of item nonresponse to the filter question and commission errors out of all the experimental treatments, and the rates of commission errors were statistically lower than the control. In addition, the combination of enclosure and indentation showed no difference in omission errors compared to the control form. Even though there were no decreases in error rates for respondents with low linguistic abilities or with less motivation to complete the survey, this treatment did not increase the skip errors for any subgroup, unlike the other treatments. Specifically, enclosure only increased rates of item nonresponse to the filter question for less motivated respondents, indentation

only increased omission errors overall, and sub-numbering only increased rates of item nonresponse to the filter question overall. I also found that the rates of skip pattern errors for the other combination forms featuring sub-numbering did not significantly differ from the control in the overall analysis. Therefore, these are not the best visual design elements for reducing skip pattern errors.

The fact that the best treatment includes two visual design elements, indicates that respondents may benefit from additional visual cues. Enclosure and indentation build on each other during visual processing and the combination of the two elements assist respondents more than a single element. Both of these elements are identified during pre-attentive processing which means that the visual design features are noticed subconsciously. This is contrary to sub-numbering which is processed during attentive processing and requires respondents to consciously analyze this element which could be more challenging for respondents. Results from this dissertation lend support to this idea as sub-numbering did not reduce the skip errors compared to the control and sometimes increased errors. For example, respondents had higher rates of item nonresponse to the filter question when sub-numbering was present indicating that the conscious processing of the sub-numbering is pulling focus away from the task at hand instead of assisting in the navigation for respondents.

Researchers should consider these ideas when designing surveys even if skip patterns are not present in the survey. For example, using visual design elements that are identified and processed during attentive processing does not assist respondents and may pull the focus away from the task at hand, namely answering the survey questions. Therefore, researchers should use visual design elements that are noticed in pre-attentive processing such as color, shape, size, contrast or positioning on the page, and these elements should be used with a unique purpose

to assist respondents. For example, researchers can use the size of an answer box to assist respondents with expectations (Smyth et al., 2009; Stern et al., 2007), or can create a visual break between a scale of items and a "don't know" response option (Tourangeau et al., 2004) to make the endpoints of the scale more prominent. Both of these examples use visual design elements that are identified in pre-attentive processing (size and positioning on the page, respectively) thus assisting respondents without pulling their focus away from answering the question.

5.4 **Limitations**

There were two main limitations to this dissertation that should be examined in future studies. First, the labor survey contained all behavioral filter questions with behavioral follow-up questions. Literature indicates that the thought process respondents go through when answering behavioral questions is different from that of attitudinal questions (Tourangeau et al., 2000). Therefore, the lack of variety in these questions for the labor survey could be a confounding factor in the results. Additionally, the majority of the follow-up questions in the labor survey were open-ended. Previous research has found that respondents are less likely to answer open-ended questions (Dillman et al., 2014; Israel and Lamm, 2012; Millar and Dillman, 2012). Thus, the large amount of open-ended questions in the Labor survey likely increased the rate of omission errors. These limitations mean that the findings from the labor survey may not be generalizable to surveys with other types of questions or on other topics. This is particularly important for the findings for sub-numbering, as the UNL survey did not examine this visual grouping element.

Second, the UNL survey had a smaller sample size, reducing the power for analyses. Therefore, the lack of significance for some differences in the UNL survey may be due to limited power. Researchers should continue this research with

surveys that have larger sample sizes to increase the power for analyses.

5.5 Future Research

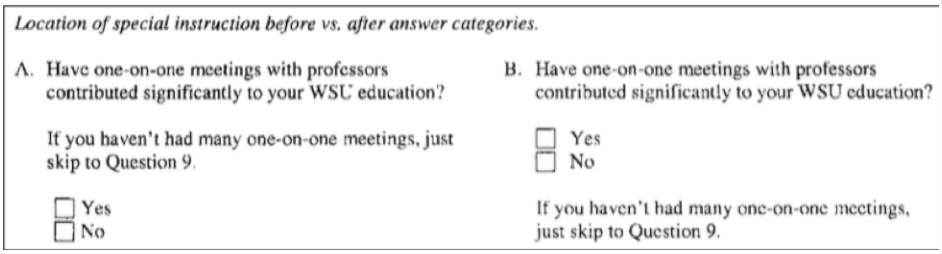
As this is the first study to examine these visual grouping principles in skip patterns, more research is needed with different question types and topics to gain more understanding about how these grouping principles help respondents. Researchers should start by examining surveys with a wide array of question characteristics such as attitudinal and behavioral questions, and open and closed-ended follow-up questions. Other factors that might have an impact on skip errors are the number of questions in the skip pattern, nesting skip patterns, skip patterns that span multiple pages or complex skip patterns that have multiple groups of follow-up questions based on different responses to the filter question.

Besides retesting the visual design elements addressed in this dissertation, researchers should expand the research and test other visual design elements; specifically, other visual design elements that are identified and processed during pre-attentive processing. For example, future studies could examine the placement of the arrow. Arrows can be considered symbols and common knowledge to respondents, therefore are processed during pre-attentive processing. Current practice is to have the arrow lead from the response option in the filter question to the start of the first follow-up question. Redline and colleagues (2003) placed the arrow on the left side of the skip pattern while Gohring and Smyth (2013) placed the arrow on the right. However, there is no published research that indicates if placing the arrow on one side reduces skip errors further than placing the arrow on the other side. More research should be done to determine if other visual design elements assist respondents when navigating skip patterns, as well as the best location and placement of these cues.

Additionally, researchers should consider subgroups of respondents and not just the entire population. This is especially important with skip patterns as only specific subgroups of respondents will answer the follow-up questions. Ensuring that the visual design elements work for subgroups of interest as well as the entire population will provide the researcher with higher quality data.

Finally, researchers should consider other areas of a survey where including visual design elements could assist respondents. For example, more complex questions may have instructions or definitions on what to include in the response or how to answer the question. Researchers may be able to utilize visual design elements such as separate enclosure for these instruction or definitions. The added contrast of the separate enclosure, implemented with either a different color or shade, could sub-consciously direct the respondents attention to the instructions. Adding the visual design element could increase the chance that respondents will read and use the instructions, without being intrusive and pulling the focus away from the response task. This is only one example of where researchers can use visual design elements to assist respondents. With the current increasing trend in self-administered surveys, researchers need to be aware of how the visual design elements are impacting response quality, and utilize the visual design elements in ways that can assist respondents.

Appendix A: Examples of Skip Patterns from Previous Literature



Location of special instruction before vs. after answer categories.

A. Have one-on-one meetings with professors contributed significantly to your WSU education?

If you haven't had many one-on-one meetings, just skip to Question 9.

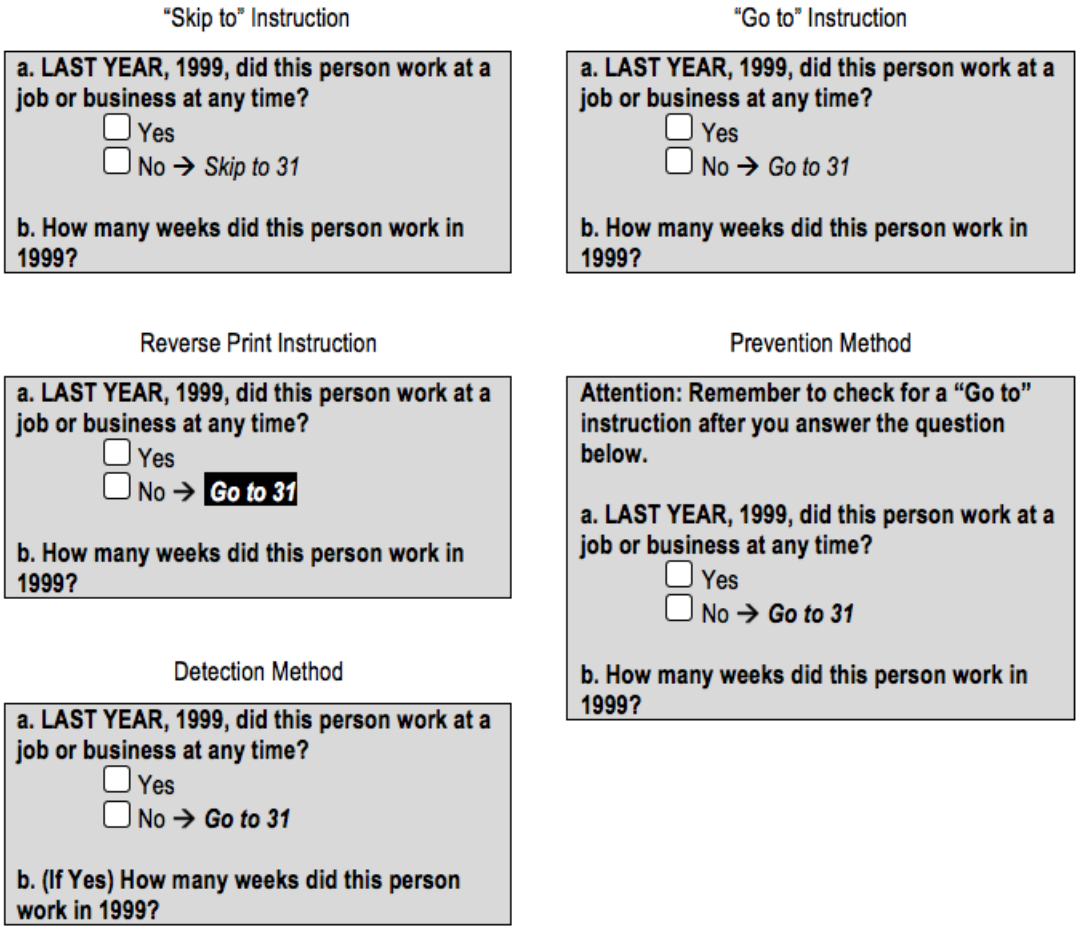
☐ Yes
☐ No

B. Have one-on-one meetings with professors contributed significantly to your WSU education?

☐ Yes
☐ No

If you haven't had many one-on-one meetings, just skip to Question 9.

Figure A.1: Skip pattern example from Christian and Dillman (2004)



"Skip to" Instruction

a. LAST YEAR, 1999, did this person work at a job or business at any time?
☐ Yes
☐ No → *Skip to 31*

b. How many weeks did this person work in 1999?

"Go to" Instruction

a. LAST YEAR, 1999, did this person work at a job or business at any time?
☐ Yes
☐ No → *Go to 31*

b. How many weeks did this person work in 1999?

Reverse Print Instruction

a. LAST YEAR, 1999, did this person work at a job or business at any time?
☐ Yes
☐ No → ***Go to 31***

b. How many weeks did this person work in 1999?

Prevention Method

Attention: Remember to check for a "Go to" instruction after you answer the question below.

a. LAST YEAR, 1999, did this person work at a job or business at any time?
☐ Yes
☐ No → ***Go to 31***

b. How many weeks did this person work in 1999?

Detection Method

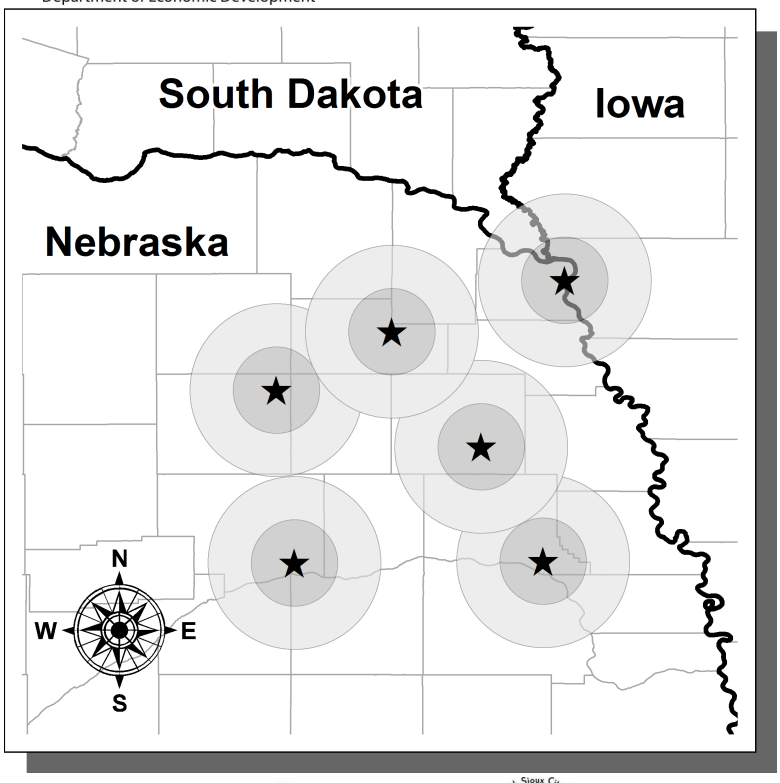
a. LAST YEAR, 1999, did this person work at a job or business at any time?
☐ Yes
☐ No → ***Go to 31***

b. (If Yes) How many weeks did this person work in 1999?

Figure A.2: Example of skip pattern designs tested in Redline et al. (2003)

Appendix B: Labor Survey: Control Form

Workforce Study of Northeast Nebraska



Bureau of Sociological Research
University of Nebraska-Lincoln

Labor Survey: Control Form, Page 2

Section 1. Employment Status

1. Which of the following best describes your employment status?

- ○ Employed
- ○ Unemployed
- ○ Retired
- ○ Homemaker

Go to Section 2

2. Are you self-employed?

- ○ Yes
- ○ No

3. Do you work for more than one employer (including yourself if self-employed)?

- ○ Yes
- ○ No →**Go to Section 3**

4. (If Yes) Including yourself if you are self-employed, how many employers do you work for?

☐☐ Number of employers (including self)

5. About how many hours do you work a week at all jobs?

☐☐ Number of hours per week

6. What is the main reason you work multiple jobs?

- ○ Additional income
- ○ Benefits
- ○ Personal fulfillment
- ○ Other, specify:

Go to Section 3

Section 2. Unemployed, Retired, and Homemaker Employment Overview

The following questions ask for information about your past employment. Please give answers for your most recent position at your primary employer—the job for which you received the bulk of your pay.

7. What was your job title at your primary employer?

8. Describe your main duties and skills used at your primary employer.

9. About how many hours did you work a week, at your primary employer?

☐☐ Number of hours per week

10. What was your pay per hour or yearly salary at your primary employer?

$☐☐.☐☐ per hour

OR

$☐☐☐,☐☐☐ per year

11. What were the city, zip code, and county of your primary employer?

City

Zip Code

County

Labor Survey: Control Form, Page 3

12. In what industry was your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

13. Are you currently seeking work or looking to reenter the labor force in the next year?

- ○ Yes **→Go to Question 27**
- ○ No **→Go to Question 33**

Section 3. Current Employment Overview

The following questions ask for information about your current employment. If you work multiple jobs, the questions refer to your primary employer—the job for which you receive the bulk of your pay.

14. What is your job title at your primary employer?

_____

15. Describe your main duties and skills used at your primary employer.

_____

16. About how many hours do you work a week, at your primary employer?

_____ Number of hours per week

17. At your primary employer is your employment permanent, temporary, or seasonal?

- ○ Permanent
- ○ Temporary
- ○ Seasonal

18. What is your pay per hour or yearly salary at your primary employer?

$_____._____ per hour

OR

$_____,_____ per year

19. What are the city, zip code, and county of your primary employer?

_____ City

_____ Zip Code

_____ County

Labor Survey: Control Form, Page 4

20. In what industry is your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify:

21. How many years and months have you worked for your primary employer?

☐☐ Years AND ☐☐ Months

22. What kind of transportation do you use to get to your primary job?

- ○ Only work at home →**Go to Question 26**
- ○ Drive alone
- ○ Carpool
- ○ Walk
- ○ Bike
- ○ Other, specify:

23. How long does it take you to travel one way to work at your primary job?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

24. How satisfied or dissatisfied are you with the length of your commute?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

25. Please explain your satisfaction or dissatisfaction with the length of your commute.

26. Please indicate whether or not you receive each of the following benefits at your primary employer.

	Yes	No
a. Health insurance	○	○
b. Dental insurance	○	○
c. Vision insurance	○	○
d. Retirement	○	○
e. Paid vacation	○	○
f. Paid holidays	○	○
g. Paid sick leave	○	○
h. Tuition reimbursement	○	○
i. Other	○	○

Labor Survey: Control Form, Page 5

Section 4. Future Employment

27. Below are several items that may or may not be important when choosing to improve your employment situation. Please indicate how important each item is to your decision to change or reenter employment.

	Not at all important	Somewhat important	Important	Very important
a. Salary	○	○	○	○
b. Commuting distance	○	○	○	○
c. Work schedule that fits my needs	○	○	○	○
d. Health insurance	○	○	○	○
e. Dental insurance	○	○	○	○
f. Vision insurance	○	○	○	○
g. Retirement benefits	○	○	○	○
h. Paid vacation	○	○	○	○
i. Paid holidays	○	○	○	○
j. Paid sick leave	○	○	○	○
k. Tuition reimbursement	○	○	○	○
l. Accessible childcare	○	○	○	○
m. Opportunity for advancement	○	○	○	○
n. Use skills you have	○	○	○	○
o. Level of responsibilities	○	○	○	○
p. Work from home/telecommuting	○	○	○	○
q. Learn new skills	○	○	○	○

28. If a job were available that met your most important criteria, what is the minimum pay you would require to improve your employment situation?

$ ☐☐☐.☐☐ per hour

OR

$ ☐☐☐,☐☐☐ per year

29. What is the maximum commute you would accept in order to improve your employment situation?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

30. Would you be willing to retrain or learn skills that may improve your employment situation?

- ○ Yes
- ○ No

31. How likely or unlikely are you to change jobs or reenter the workforce in the next year if a suitable job is available?

- ○ Very likely
- ○ Likely
- ○ Neither likely nor unlikely
- ○ Unlikely
- ○ Very unlikely

Labor Survey: Control Form, Page 6

32. Please indicate whether or not each of the following obstacles may prevent you from changing your job or reentering the workforce in the next year.

	Yes	No
a. Transportation	○	○
b. Lack of childcare	○	○
c. Lack of education	○	○
d. Lack of training	○	○
e. Criminal record	○	○
f. Employment history	○	○
g. Poor credit	○	○
h. No job experience	○	○
i. Language barriers	○	○
j. Family commitments	○	○
k. Overqualified	○	○
l. Disability	○	○
m. Inadequate pay offered at area employers	○	○
n. Inadequate benefits at area employers	○	○
o. Inadequate hours offered at area employers	○	○
p. Lack of job opportunities in the area	○	○
q. Contractual commitments	○	○
r. Other, specify:	○	○

Section 5. About You

33. What is your gender?
- ○ Female
- ○ Male

34. In what year were you born?

1 9 ☐ ☐

35. Are you a military veteran?
- ○ Yes
- ○ No

36. What is your current marital or relationship status?
- ○ Married
- ○ Married, living apart
- ○ Unmarried partner (cohabiting)
- ○ Never married
- ○ Divorced
- ○ Widowed
- ○ Separated

37. Including yourself, how many adults age 19 and older live in your household?

☐☐ Number of adults (age 19 and older)

38. How many children ages:
(Please write "0" if none.)

a. 5 and younger live in your household? ☐☐
b. 6 to 12 live in your household? ☐☐
c. 13 to 18 live in your household? ☐☐

39. Are you a high school graduate or do you have a GED?
- ○ Yes
- ○ No

Labor Survey: Control Form, Page 7

40. Do you have a technical or vocational degree?
- ○ Yes
- ○ No →**Go to Question 42**

41. (If Yes) What did you study in technical or vocational school?

42. Did you attend either a 2 or 4-year college?
- ○ Yes
- ○ No →**Go to Question 50**

43. (If Yes) What did you study in college?

44. Do you have an Associates or 2-year degree?
- ○ Yes
- ○ No →**Go to Question 46**

45. (If Yes) In what field is your Associates or 2-year degree?

46. Do you have a Bachelor's or 4-year degree?
- ○ Yes
- ○ No →**Go to Question 50**

47. (If Yes) In what field is your Bachelor's or 4-year degree?

48. Do you have a graduate or professional degree?
- ○ Yes
- ○ No →**Go to Question 50**

49. (If Yes) In what field is your graduate or professional degree?

50. Are you currently attending a trade/vocational school, community college, or 4-year college?
- ○ Yes
- ○ No →**Go to Question 52**

51. (If Yes) What is your intended vocational training or college major?

52. Are you planning to attend a trade/vocational school, community college, or 4-year college in the next year?
- ○ Yes
- ○ No →**Go to Question 54**

53. (If Yes) What is your intended vocational training or college major?

54. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

55. What race or races do you consider yourself to be? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, specify:

56. What is your current zip code?

Labor Survey: Control Form, Page 8

Please use the space below to provide any comments or feedback.

Thank you!

That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

Questions or requests from this survey can be directed to:
Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

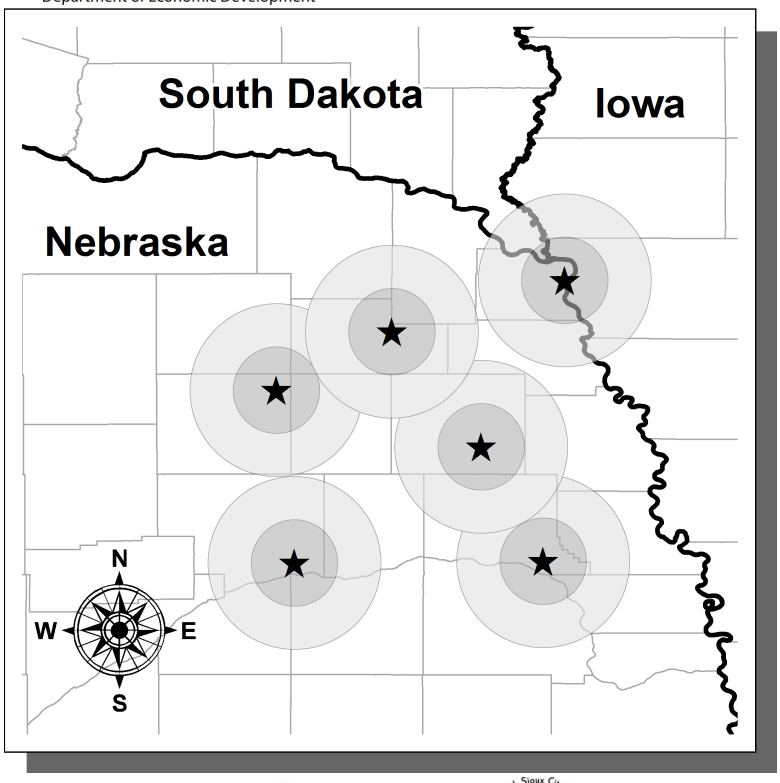
Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

Appendix C: Labor Survey: Enclosure Only Form

Workforce Study of Northeast Nebraska

NEBRASKA
possibilities...endless℠
Department of Economic Development

NEBRASKA
DEPARTMENT OF LABOR



GreaterFREMONT DEVELOPMENT COUNCIL
Wayne Area Economic Development Chamber • Main Street
WEST POINT THE BEST POINT
South Sioux City, NEBRASKA Quality of Life... A Cardinal Rule
CITY OF FREMONT NEBRASKA PATHFINDERS

Bureau of Sociological Research
University of Nebraska-Lincoln

Labor Survey: Enclosure Only Form, Page 2

Section 1. Employment Status

1. Which of the following best describes your employment status?

- ○ Employed
- ○ Unemployed
- ○ Retired
- ○ Homemaker

Go to Section 2

2. Are you self-employed?

- ○ Yes
- ○ No

3. Do you work for more than one employer (including yourself if self-employed)?

- ○ Yes
- ○ No →**Go to Section 3**

4. (If Yes) Including yourself if you are self-employed, how many employers do you work for?

☐☐ Number of employers (including self)

5. About how many hours do you work a week at all jobs?

☐☐ Number of hours per week

6. What is the main reason you work multiple jobs?

- ○ Additional income
- ○ Benefits
- ○ Personal fulfillment
- ○ Other, specify:

Go to Section 3

Section 2. Unemployed, Retired, and Homemaker Employment Overview

The following questions ask for information about your past employment. Please give answers for your most recent position at your primary employer—the job for which you received the bulk of your pay.

7. What was your job title at your primary employer?

8. Describe your main duties and skills used at your primary employer.

9. About how many hours did you work a week, at your primary employer?

☐☐ Number of hours per week

10. What was your pay per hour or yearly salary at your primary employer?

$☐☐.☐☐ per hour

OR

$☐☐☐,☐☐☐ per year

11. What were the city, zip code, and county of your primary employer?

City

Zip Code

County

Labor Survey: Enclosure Only Form, Page 3

12. In what industry was your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

13. Are you currently seeking work or looking to reenter the labor force in the next year?

- ○ Yes **→Go to Question 27**
- ○ No **→Go to Question 33**

Section 3. Current Employment Overview

The following questions ask for information about your current employment. If you work multiple jobs, the questions refer to your primary employer—the job for which you receive the bulk of your pay.

14. What is your job title at your primary employer?

_____

15. Describe your main duties and skills used at your primary employer.

_____

16. About how many hours do you work a week, at your primary employer?

_____ Number of hours per week

17. At your primary employer is your employment permanent, temporary, or seasonal?

- ○ Permanent
- ○ Temporary
- ○ Seasonal

18. What is your pay per hour or yearly salary at your primary employer?

$_____.____ per hour

OR

$_____,_____ per year

19. What are the city, zip code, and county of your primary employer?

_____ City

_____ Zip Code

_____ County

Labor Survey: Enclosure Only Form, Page 4

20. In what industry is your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify:

21. How many years and months have you worked for your primary employer?

☐☐ Years AND ☐☐ Months

22. What kind of transportation do you use to get to your primary job?

- ○ Only work at home →**Go to Question 26**
- ○ Drive alone
- ○ Carpool
- ○ Walk
- ○ Bike
- ○ Other, specify:

23. How long does it take you to travel one way to work at your primary job?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

24. How satisfied or dissatisfied are you with the length of your commute?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

25. Please explain your satisfaction or dissatisfaction with the length of your commute.

26. Please indicate whether or not you receive each of the following benefits at your primary employer.

	Yes	No
a. Health insurance	○	○
b. Dental insurance	○	○
c. Vision insurance	○	○
d. Retirement	○	○
e. Paid vacation	○	○
f. Paid holidays	○	○
g. Paid sick leave	○	○
h. Tuition reimbursement	○	○
i. Other	○	○

Labor Survey: Enclosure Only Form, Page 5

Section 4. Future Employment

27. Below are several items that may or may not be important when choosing to improve your employment situation. Please indicate how important each item is to your decision to change or reenter employment.

	Not at all important	Somewhat important	Important	Very important
a. Salary	○	○	○	○
b. Commuting distance	○	○	○	○
c. Work schedule that fits my needs	○	○	○	○
d. Health insurance	○	○	○	○
e. Dental insurance	○	○	○	○
f. Vision insurance	○	○	○	○
g. Retirement benefits	○	○	○	○
h. Paid vacation	○	○	○	○
i. Paid holidays	○	○	○	○
j. Paid sick leave	○	○	○	○
k. Tuition reimbursement	○	○	○	○
l. Accessible childcare	○	○	○	○
m. Opportunity for advancement	○	○	○	○
n. Use skills you have	○	○	○	○
o. Level of responsibilities	○	○	○	○
p. Work from home/telecommuting	○	○	○	○
q. Learn new skills	○	○	○	○

28. If a job were available that met your most important criteria, what is the minimum pay you would require to improve your employment situation?

$ ☐☐☐.☐☐ per hour

OR

$ ☐☐☐,☐☐☐ per year

29. What is the maximum commute you would accept in order to improve your employment situation?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

30. Would you be willing to retrain or learn skills that may improve your employment situation?

- ○ Yes
- ○ No

31. How likely or unlikely are you to change jobs or reenter the workforce in the next year if a suitable job is available?

- ○ Very likely
- ○ Likely
- ○ Neither likely nor unlikely
- ○ Unlikely
- ○ Very unlikely

Labor Survey: Enclosure Only Form, Page 6

32. Please indicate whether or not each of the following obstacles may prevent you from changing your job or reentering the workforce in the next year.

	Yes	No
a. Transportation	○	○
b. Lack of childcare	○	○
c. Lack of education	○	○
d. Lack of training	○	○
e. Criminal record	○	○
f. Employment history	○	○
g. Poor credit	○	○
h. No job experience	○	○
i. Language barriers	○	○
j. Family commitments	○	○
k. Overqualified	○	○
l. Disability	○	○
m. Inadequate pay offered at area employers	○	○
n. Inadequate benefits at area employers	○	○
o. Inadequate hours offered at area employers	○	○
p. Lack of job opportunities in the area	○	○
q. Contractual commitments	○	○
r. Other, specify:	○	○

Section 5. About You

33. What is your gender?
- ○ Female
- ○ Male

34. In what year were you born?

1 9 ☐ ☐

35. Are you a military veteran?
- ○ Yes
- ○ No

36. What is your current marital or relationship status?
- ○ Married
- ○ Married, living apart
- ○ Unmarried partner (cohabiting)
- ○ Never married
- ○ Divorced
- ○ Widowed
- ○ Separated

37. Including yourself, how many adults age 19 and older live in your household?

☐☐ Number of adults (age 19 and older)

38. How many children ages:
(Please write "0" if none.)

a. 5 and younger live in your household? ☐☐
b. 6 to 12 live in your household? ☐☐
c. 13 to 18 live in your household? ☐☐

39. Are you a high school graduate or do you have a GED?
- ○ Yes
- ○ No

Labor Survey: Enclosure Only Form, Page 7

40. Do you have a technical or vocational degree?
- ○ Yes
- ○ No →**Go to Question 42**

41. (If Yes) What did you study in technical or vocational school?

42. Did you attend either a 2 or 4-year college?
- ○ Yes
- ○ No →**Go to Question 50**

43. (If Yes) What did you study in college?

44. Do you have an Associates or 2-year degree?
- ○ Yes
- ○ No →**Go to Question 46**

45. (If Yes) In what field is your Associates or 2-year degree?

46. Do you have a Bachelor's or 4-year degree?
- ○ Yes
- ○ No →**Go to Question 50**

47. (If Yes) In what field is your Bachelor's or 4-year degree?

48. Do you have a graduate or professional degree?
- ○ Yes
- ○ No →**Go to Question 50**

49. (If Yes) In what field is your graduate or professional degree?

50. Are you currently attending a trade/vocational school, community college, or 4-year college?
- ○ Yes
- ○ No →**Go to Question 52**

51. (If Yes) What is your intended vocational training or college major?

52. Are you planning to attend a trade/vocational school, community college, or 4-year college in the next year?
- ○ Yes
- ○ No →**Go to Question 54**

53. (If Yes) What is your intended vocational training or college major?

54. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

55. What race or races do you consider yourself to be? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, specify:

56. What is your current zip code?

Labor Survey: Enclosure Only Form, Page 8

Please use the space below to provide any comments or feedback.

Thank you!

That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

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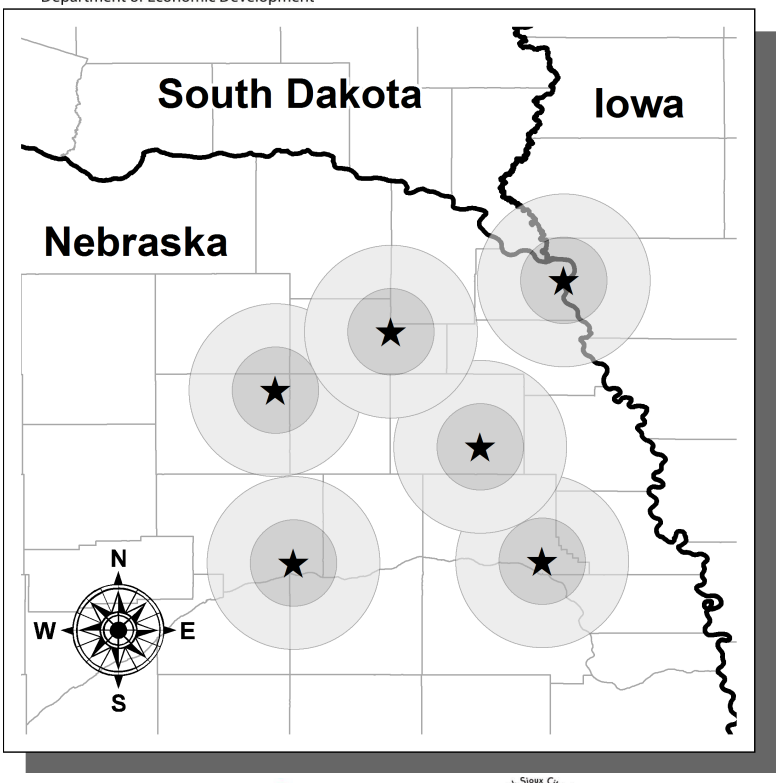
Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

Appendix D: Labor Survey: Indentation Only Form

Workforce Study of Northeast Nebraska



Bureau of Sociological Research
University of Nebraska-Lincoln

Labor Survey: Indentation Only Form, Page 2

Section 1. Employment Status

1. Which of the following best describes your employment status?

- ○ Employed
- ○ Unemployed
- ○ Retired
- ○ Homemaker

Go to Section 2

2. Are you self-employed?

- ○ Yes
- ○ No

3. Do you work for more than one employer (including yourself if self-employed)?

- ○ Yes
- ○ No →**Go to Section 3**

4. (If Yes) Including yourself if you are self-employed, how many employers do you work for?

☐☐ Number of employers (including self)

5. About how many hours do you work a week at all jobs?

☐☐ Number of hours per week

6. What is the main reason you work multiple jobs?

- ○ Additional income
- ○ Benefits
- ○ Personal fulfillment
- ○ Other, specify:

Go to Section 3

Section 2. Unemployed, Retired, and Homemaker Employment Overview

The following questions ask for information about your past employment. Please give answers for your most recent position at your primary employer—the job for which you received the bulk of your pay.

7. What was your job title at your primary employer?

8. Describe your main duties and skills used at your primary employer.

9. About how many hours did you work a week, at your primary employer?

☐☐ Number of hours per week

10. What was your pay per hour or yearly salary at your primary employer?

$☐☐.☐☐ per hour

OR

$☐☐☐,☐☐☐ per year

11. What were the city, zip code, and county of your primary employer?

City

Zip Code

County

Labor Survey: Indentation Only Form, Page 3

12. In what industry was your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

13. Are you currently seeking work or looking to reenter the labor force in the next year?

- ○ Yes **→Go to Question 27**
- ○ No **→Go to Question 33**

Section 3. Current Employment Overview

The following questions ask for information about your current employment. If you work multiple jobs, the questions refer to your primary employer—the job for which you receive the bulk of your pay.

14. What is your job title at your primary employer?

_____

15. Describe your main duties and skills used at your primary employer.

_____

16. About how many hours do you work a week, at your primary employer?

_____ Number of hours per week

17. At your primary employer is your employment permanent, temporary, or seasonal?

- ○ Permanent
- ○ Temporary
- ○ Seasonal

18. What is your pay per hour or yearly salary at your primary employer?

$_____.____ per hour

OR

$_____,_____ per year

19. What are the city, zip code, and county of your primary employer?

_____ City

_____ Zip Code

_____ County

Labor Survey: Indentation Only Form, Page 4

20. In what industry is your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify:

21. How many years and months have you worked for your primary employer?

☐☐ Years AND ☐☐ Months

22. What kind of transportation do you use to get to your primary job?

- ○ Only work at home →**Go to Question 26**
- ○ Drive alone
- ○ Carpool
- ○ Walk
- ○ Bike
- ○ Other, specify:

23. How long does it take you to travel one way to work at your primary job?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

24. How satisfied or dissatisfied are you with the length of your commute?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

25. Please explain your satisfaction or dissatisfaction with the length of your commute.

26. Please indicate whether or not you receive each of the following benefits at your primary employer.

	Yes	No
a. Health insurance	○	○
b. Dental insurance	○	○
c. Vision insurance	○	○
d. Retirement	○	○
e. Paid vacation	○	○
f. Paid holidays	○	○
g. Paid sick leave	○	○
h. Tuition reimbursement	○	○
i. Other	○	○

Labor Survey: Indentation Only Form, Page 5

Section 4. Future Employment

27. Below are several items that may or may not be important when choosing to improve your employment situation. Please indicate how important each item is to your decision to change or reenter employment.

	Not at all important	Somewhat important	Important	Very important
a. Salary	○	○	○	○
b. Commuting distance	○	○	○	○
c. Work schedule that fits my needs	○	○	○	○
d. Health insurance	○	○	○	○
e. Dental insurance	○	○	○	○
f. Vision insurance	○	○	○	○
g. Retirement benefits	○	○	○	○
h. Paid vacation	○	○	○	○
i. Paid holidays	○	○	○	○
j. Paid sick leave	○	○	○	○
k. Tuition reimbursement	○	○	○	○
l. Accessible childcare	○	○	○	○
m. Opportunity for advancement	○	○	○	○
n. Use skills you have	○	○	○	○
o. Level of responsibilities	○	○	○	○
p. Work from home/telecommuting	○	○	○	○
q. Learn new skills	○	○	○	○

28. If a job were available that met your most important criteria, what is the minimum pay you would require to improve your employment situation?

$ ☐☐☐.☐☐ per hour

OR

$ ☐☐☐,☐☐☐ per year

29. What is the maximum commute you would accept in order to improve your employment situation?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

30. Would you be willing to retrain or learn skills that may improve your employment situation?

- ○ Yes
- ○ No

31. How likely or unlikely are you to change jobs or reenter the workforce in the next year if a suitable job is available?

- ○ Very likely
- ○ Likely
- ○ Neither likely nor unlikely
- ○ Unlikely
- ○ Very unlikely

Labor Survey: Indentation Only Form, Page 6

32. Please indicate whether or not each of the following obstacles may prevent you from changing your job or reentering the workforce in the next year.

	Yes	No
a. Transportation	○	○
b. Lack of childcare	○	○
c. Lack of education	○	○
d. Lack of training	○	○
e. Criminal record	○	○
f. Employment history	○	○
g. Poor credit	○	○
h. No job experience	○	○
i. Language barriers	○	○
j. Family commitments	○	○
k. Overqualified	○	○
l. Disability	○	○
m. Inadequate pay offered at area employers	○	○
n. Inadequate benefits at area employers	○	○
o. Inadequate hours offered at area employers	○	○
p. Lack of job opportunities in the area	○	○
q. Contractual commitments	○	○
r. Other, specify:	○	○

Section 5. About You

33. What is your gender?
- ○ Female
- ○ Male

34. In what year were you born?

1 9 ☐ ☐

35. Are you a military veteran?
- ○ Yes
- ○ No

36. What is your current marital or relationship status?
- ○ Married
- ○ Married, living apart
- ○ Unmarried partner (cohabiting)
- ○ Never married
- ○ Divorced
- ○ Widowed
- ○ Separated

37. Including yourself, how many adults age 19 and older live in your household?

☐☐ Number of adults (age 19 and older)

38. How many children ages:
(Please write "0" if none.)

a. 5 and younger live in your household? ☐☐
b. 6 to 12 live in your household? ☐☐
c. 13 to 18 live in your household? ☐☐

39. Are you a high school graduate or do you have a GED?
- ○ Yes
- ○ No

Labor Survey: Indentation Only Form, Page 7

40. Do you have a technical or vocational degree?
- ○ Yes
- ○ No →**Go to Question 42**

41. (If Yes) What did you study in technical or vocational school?

42. Did you attend either a 2 or 4-year college?
- ○ Yes
- ○ No →**Go to Question 50**

43. (If Yes) What did you study in college?

44. Do you have an Associates or 2-year degree?
- ○ Yes
- ○ No →**Go to Question 46**

45. (If Yes) In what field is your Associates or 2-year degree?

46. Do you have a Bachelor's or 4-year degree?
- ○ Yes
- ○ No →**Go to Question 50**

47. (If Yes) In what field is your Bachelor's or 4-year degree?

48. Do you have a graduate or professional degree?
- ○ Yes
- ○ No →**Go to Question 50**

49. (If Yes) In what field is your graduate or professional degree?

50. Are you currently attending a trade/vocational school, community college, or 4-year college?
- ○ Yes
- ○ No →**Go to Question 52**

51. (If Yes) What is your intended vocational training or college major?

52. Are you planning to attend a trade/vocational school, community college, or 4-year college in the next year?
- ○ Yes
- ○ No →**Go to Question 54**

53. (If Yes) What is your intended vocational training or college major?

54. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

55. What race or races do you consider yourself to be? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, specify:

56. What is your current zip code?

Labor Survey: Indentation Only Form, Page 8

Please use the space below to provide any comments or feedback.

Thank you!

That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

Questions or requests from this survey can be directed to:
Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

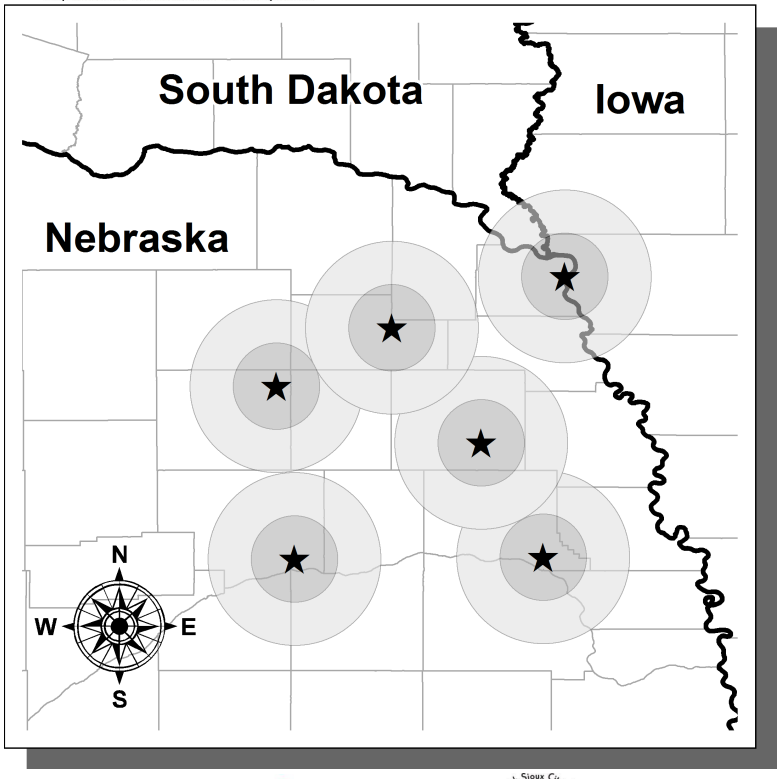
Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

Appendix E: Labor Survey: Sub-Numbering Only Form

Workforce Study of Northeast Nebraska

NEBRASKA
possibilities...endless℠
Department of Economic Development

NEBRASKA
DEPARTMENT OF LABOR



GreaterFREMONT DEVELOPMENT COUNCIL
Wayne Area Economic Development Chamber • Main Street
WEST POINT THE BEST POINT
South Sioux City, NEBRASKA Quality of Life... A Cardinal Rule
CITY OF FREMONT NEBRASKA PATHFINDERS

Bureau of Sociological Research
University of Nebraska-Lincoln

Labor Survey: Sub-Numbering Only Form, Page 2

Section 1. Employment Status

1. Which of the following best describes your employment status?

- ○ Employed
- ○ Unemployed
- ○ Retired
- ○ Homemaker

Go to Section 2

1a. Are you self-employed?

- ○ Yes
- ○ No

1b. Do you work for more than one employer (including yourself if self-employed)?

- ○ Yes
- ○ No →**Go to Section 3**

1c. (If Yes) Including yourself if you are self-employed, how many employers do you work for?

☐☐ Number of employers (including self)

1d. About how many hours do you work a week at all jobs?

☐☐ Number of hours per week

1e. What is the main reason you work multiple jobs?

- ○ Additional income
- ○ Benefits
- ○ Personal fulfillment
- ○ Other, specify:

Go to Section 3

Section 2. Unemployed, Retired, and Homemaker Employment Overview

The following questions ask for information about your past employment. Please give answers for your most recent position at your primary employer—the job for which you received the bulk of your pay.

2. What was your job title at your primary employer?

3. Describe your main duties and skills used at your primary employer.

4. About how many hours did you work a week, at your primary employer?

☐☐ Number of hours per week

5. What was your pay per hour or yearly salary at your primary employer?

$☐☐.☐☐ per hour

OR

$☐☐☐,☐☐☐ per year

6. What were the city, zip code, and county of your primary employer?

City

☐☐☐☐☐ Zip Code

County

Labor Survey: Sub-Numbering Only Form, Page 3

7. In what industry was your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

8. Are you currently seeking work or looking to reenter the labor force in the next year?

- ○ Yes **→Go to Question 19**
- ○ No **→Go to Question 25**

Section 3. Current Employment Overview

The following questions ask for information about your current employment. If you work multiple jobs, the questions refer to your primary employer—the job for which you receive the bulk of your pay.

9. What is your job title at your primary employer?

_____

10. Describe your main duties and skills used at your primary employer.

_____

11. About how many hours do you work a week, at your primary employer?

_____ Number of hours per week

12. At your primary employer is your employment permanent, temporary, or seasonal?

- ○ Permanent
- ○ Temporary
- ○ Seasonal

13. What is your pay per hour or yearly salary at your primary employer?

$_____._____ per hour

OR

$_____,_____ per year

14. What are the city, zip code, and county of your primary employer?

_____ City

_____ Zip Code

_____ County

Labor Survey: Sub-Numbering Only Form, Page 4

15. In what industry is your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify:

16. How many years and months have you worked for your primary employer?

☐☐ Years AND ☐☐ Months

17. What kind of transportation do you use to get to your primary job?

- ○ Only work at home →**Go to Question 18**
- ○ Drive alone
- ○ Carpool
- ○ Walk
- ○ Bike
- ○ Other, specify:

17a. How long does it take you to travel one way to work at your primary job?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

17b. How satisfied or dissatisfied are you with the length of your commute?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

17c. Please explain your satisfaction or dissatisfaction with the length of your commute.

18. Please indicate whether or not you receive each of the following benefits at your primary employer.

	Yes	No
a. Health insurance	○	○
b. Dental insurance	○	○
c. Vision insurance	○	○
d. Retirement	○	○
e. Paid vacation	○	○
f. Paid holidays	○	○
g. Paid sick leave	○	○
h. Tuition reimbursement	○	○
i. Other	○	○

Labor Survey: Sub-Numbering Only Form, Page 5

Section 4. Future Employment

19. Below are several items that may or may not be important when choosing to improve your employment situation. Please indicate how important each item is to your decision to change or reenter employment.

	Not at all important	Somewhat important	Important	Very important
a. Salary	○	○	○	○
b. Commuting distance	○	○	○	○
c. Work schedule that fits my needs	○	○	○	○
d. Health insurance	○	○	○	○
e. Dental insurance	○	○	○	○
f. Vision insurance	○	○	○	○
g. Retirement benefits	○	○	○	○
h. Paid vacation	○	○	○	○
i. Paid holidays	○	○	○	○
j. Paid sick leave	○	○	○	○
k. Tuition reimbursement	○	○	○	○
l. Accessible childcare	○	○	○	○
m. Opportunity for advancement	○	○	○	○
n. Use skills you have	○	○	○	○
o. Level of responsibilities	○	○	○	○
p. Work from home/telecommuting	○	○	○	○
q. Learn new skills	○	○	○	○

20. If a job were available that met your most important criteria, what is the minimum pay you would require to improve your employment situation?

$ ☐☐☐.☐☐ per hour

OR

$ ☐☐☐,☐☐☐ per year

21. What is the maximum commute you would accept in order to improve your employment situation?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

22. Would you be willing to retrain or learn skills that may improve your employment situation?

- ○ Yes
- ○ No

23. How likely or unlikely are you to change jobs or reenter the workforce in the next year if a suitable job is available?

- ○ Very likely
- ○ Likely
- ○ Neither likely nor unlikely
- ○ Unlikely
- ○ Very unlikely

Labor Survey: Sub-Numbering Only Form, Page 6

24. Please indicate whether or not each of the following obstacles may prevent you from changing your job or reentering the workforce in the next year.

	Yes	No
a. Transportation	○	○
b. Lack of childcare	○	○
c. Lack of education	○	○
d. Lack of training	○	○
e. Criminal record	○	○
f. Employment history	○	○
g. Poor credit	○	○
h. No job experience	○	○
i. Language barriers	○	○
j. Family commitments	○	○
k. Overqualified	○	○
l. Disability	○	○
m. Inadequate pay offered at area employers	○	○
n. Inadequate benefits at area employers	○	○
o. Inadequate hours offered at area employers	○	○
p. Lack of job opportunities in the area	○	○
q. Contractual commitments	○	○
r. Other, specify:	○	○

Section 5. About You

25. What is your gender?
- ○ Female
- ○ Male

26. In what year were you born?

1 9 ☐ ☐

27. Are you a military veteran?
- ○ Yes
- ○ No

28. What is your current marital or relationship status?
- ○ Married
- ○ Married, living apart
- ○ Unmarried partner (cohabiting)
- ○ Never married
- ○ Divorced
- ○ Widowed
- ○ Separated

29. Including yourself, how many adults age 19 and older live in your household?

☐☐ Number of adults (age 19 and older)

30. How many children ages:
(Please write "0" if none.)

a. 5 and younger live in your household? ☐☐
b. 6 to 12 live in your household? ☐☐
c. 13 to 18 live in your household? ☐☐

31. Are you a high school graduate or do you have a GED?
- ○ Yes
- ○ No

Labor Survey: Sub-Numbering Only Form, Page 7

32. Do you have a technical or vocational degree?
- ○ Yes
- ○ No →**Go to Question 33**

32a. (If Yes) What did you study in technical or vocational school?

33. Did you attend either a 2 or 4-year college?
- ○ Yes
- ○ No →**Go to Question 34**

33a. (If Yes) What did you study in college?

33b. Do you have an Associates or 2-year degree?
- ○ Yes
- ○ No →**Go to Question 33d**

33c. (If Yes) In what field is your Associates or 2-year degree?

33d. Do you have a Bachelor's or 4-year degree?
- ○ Yes
- ○ No →**Go to Question 34**

33e. (If Yes) In what field is your Bachelor's or 4-year degree?

33f. Do you have a graduate or professional degree?
- ○ Yes
- ○ No →**Go to Question 34**

33g. (If Yes) In what field is your graduate or professional degree?

34. Are you currently attending a trade/vocational school, community college, or 4-year college?
- ○ Yes
- ○ No →**Go to Question 35**

34a. (If Yes) What is your intended vocational training or college major?

35. Are you planning to attend a trade/vocational school, community college, or 4-year college in the next year?
- ○ Yes
- ○ No →**Go to Question 36**

35a. (If Yes) What is your intended vocational training or college major?

36. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

37. What race or races do you consider yourself to be? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, specify:

38. What is your current zip code?

Labor Survey: Sub-Numbering Only Form, Page 8

Please use the space below to provide any comments or feedback.

Thank you!

That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

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University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

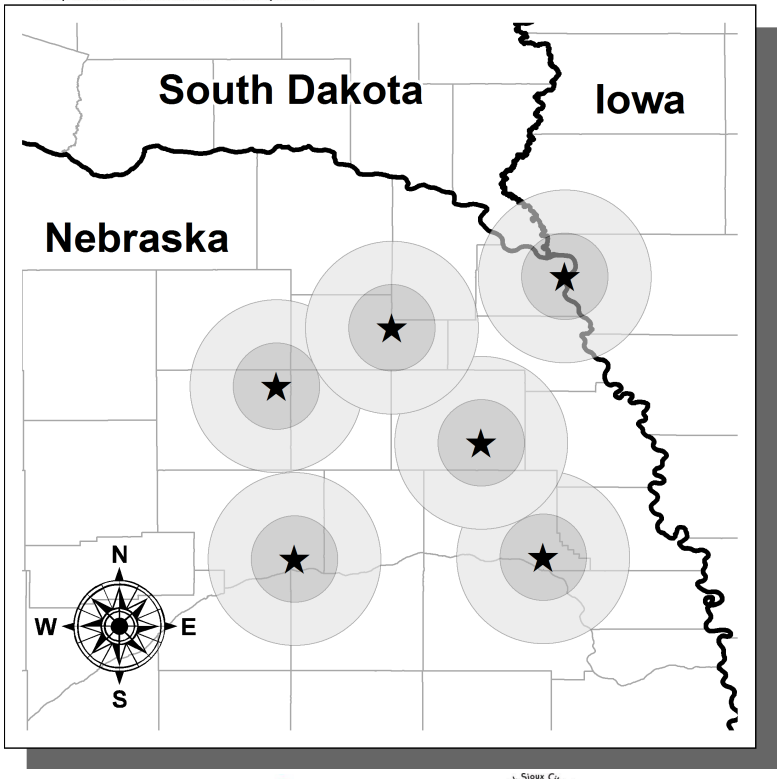
Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

Appendix F: Labor Survey: Enclosure and Indentation Form

Workforce Study of Northeast Nebraska

NEBRASKA
possibilities...endless℠
Department of Economic Development

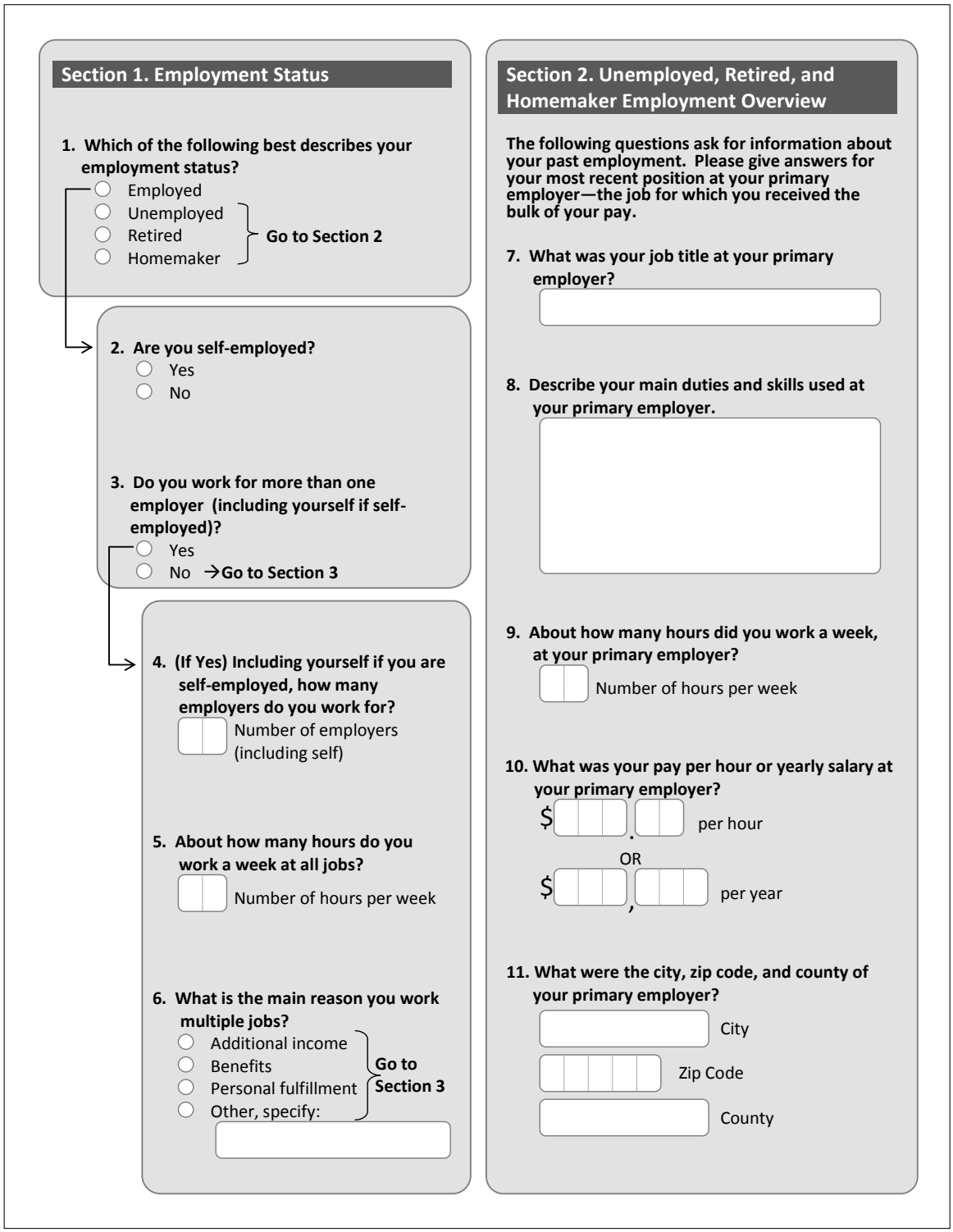
NEBRASKA
DEPARTMENT OF LABOR



GreaterFREMONT DEVELOPMENT COUNCIL
Wayne Area Economic Development Chamber • Main Street
WEST POINT THE BEST POINT
South Sioux City, NEBRASKA Quality of Life... A Cardinal Rule
CITY OF FREMONT NEBRASKA PATHFINDERS

Bureau of Sociological Research
University of Nebraska-Lincoln

Labor Survey: Enclosure and Indentation Form, Page 2



Labor Survey: Enclosure and Indentation Form, Page 3

12. In what industry was your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

13. Are you currently seeking work or looking to reenter the labor force in the next year?

- ○ Yes **→Go to Question 27**
- ○ No **→Go to Question 33**

Section 3. Current Employment Overview

The following questions ask for information about your current employment. If you work multiple jobs, the questions refer to your primary employer—the job for which you receive the bulk of your pay.

14. What is your job title at your primary employer?

_____

15. Describe your main duties and skills used at your primary employer.

_____

16. About how many hours do you work a week, at your primary employer?

_____ Number of hours per week

17. At your primary employer is your employment permanent, temporary, or seasonal?

- ○ Permanent
- ○ Temporary
- ○ Seasonal

18. What is your pay per hour or yearly salary at your primary employer?

$_____.____ per hour

OR

$_____,____ per year

19. What are the city, zip code, and county of your primary employer?

_____ City

_____ Zip Code

_____ County

Labor Survey: Enclosure and Indentation Form, Page 4

20. In what industry is your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

21. How many years and months have you worked for your primary employer?

[ ][ ] Years AND [ ][ ] Months

22. What kind of transportation do you use to get to your primary job?

- ○ Only work at home →**Go to Question 26**
- ○ Drive alone
- ○ Carpool
- ○ Walk
- ○ Bike
- ○ Other, specify: _____

23. How long does it take you to travel one way to work at your primary job?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

24. How satisfied or dissatisfied are you with the length of your commute?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

25. Please explain your satisfaction or dissatisfaction with the length of your commute.

_____

26. Please indicate whether or not you receive each of the following benefits at your primary employer.

	Yes	No
a. Health insurance	○	○
b. Dental insurance	○	○
c. Vision insurance	○	○
d. Retirement	○	○
e. Paid vacation	○	○
f. Paid holidays	○	○
g. Paid sick leave	○	○
h. Tuition reimbursement	○	○
i. Other	○	○

Labor Survey: Enclosure and Indentation Form, Page 5

Section 4. Future Employment

27. Below are several items that may or may not be important when choosing to improve your employment situation. Please indicate how important each item is to your decision to change or reenter employment.

	Not at all important	Somewhat important	Important	Very important
a. Salary	○	○	○	○
b. Commuting distance	○	○	○	○
c. Work schedule that fits my needs	○	○	○	○
d. Health insurance	○	○	○	○
e. Dental insurance	○	○	○	○
f. Vision insurance	○	○	○	○
g. Retirement benefits	○	○	○	○
h. Paid vacation	○	○	○	○
i. Paid holidays	○	○	○	○
j. Paid sick leave	○	○	○	○
k. Tuition reimbursement	○	○	○	○
l. Accessible childcare	○	○	○	○
m. Opportunity for advancement	○	○	○	○
n. Use skills you have	○	○	○	○
o. Level of responsibilities	○	○	○	○
p. Work from home/telecommuting	○	○	○	○
q. Learn new skills	○	○	○	○

28. If a job were available that met your most important criteria, what is the minimum pay you would require to improve your employment situation?

$ ☐☐☐.☐☐ per hour

OR

$ ☐☐☐,☐☐☐ per year

29. What is the maximum commute you would accept in order to improve your employment situation?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

30. Would you be willing to retrain or learn skills that may improve your employment situation?

- ○ Yes
- ○ No

31. How likely or unlikely are you to change jobs or reenter the workforce in the next year if a suitable job is available?

- ○ Very likely
- ○ Likely
- ○ Neither likely nor unlikely
- ○ Unlikely
- ○ Very unlikely

Labor Survey: Enclosure and Indentation Form, Page 6

32. Please indicate whether or not each of the following obstacles may prevent you from changing your job or reentering the workforce in the next year.

	Yes	No
a. Transportation	○	○
b. Lack of childcare	○	○
c. Lack of education	○	○
d. Lack of training	○	○
e. Criminal record	○	○
f. Employment history	○	○
g. Poor credit	○	○
h. No job experience	○	○
i. Language barriers	○	○
j. Family commitments	○	○
k. Overqualified	○	○
l. Disability	○	○
m. Inadequate pay offered at area employers	○	○
n. Inadequate benefits at area employers	○	○
o. Inadequate hours offered at area employers	○	○
p. Lack of job opportunities in the area	○	○
q. Contractual commitments	○	○
r. Other, specify:	○	○

Section 5. About You

33. What is your gender?
- ○ Female
- ○ Male

34. In what year were you born?
1 9 ☐ ☐

35. Are you a military veteran?
- ○ Yes
- ○ No

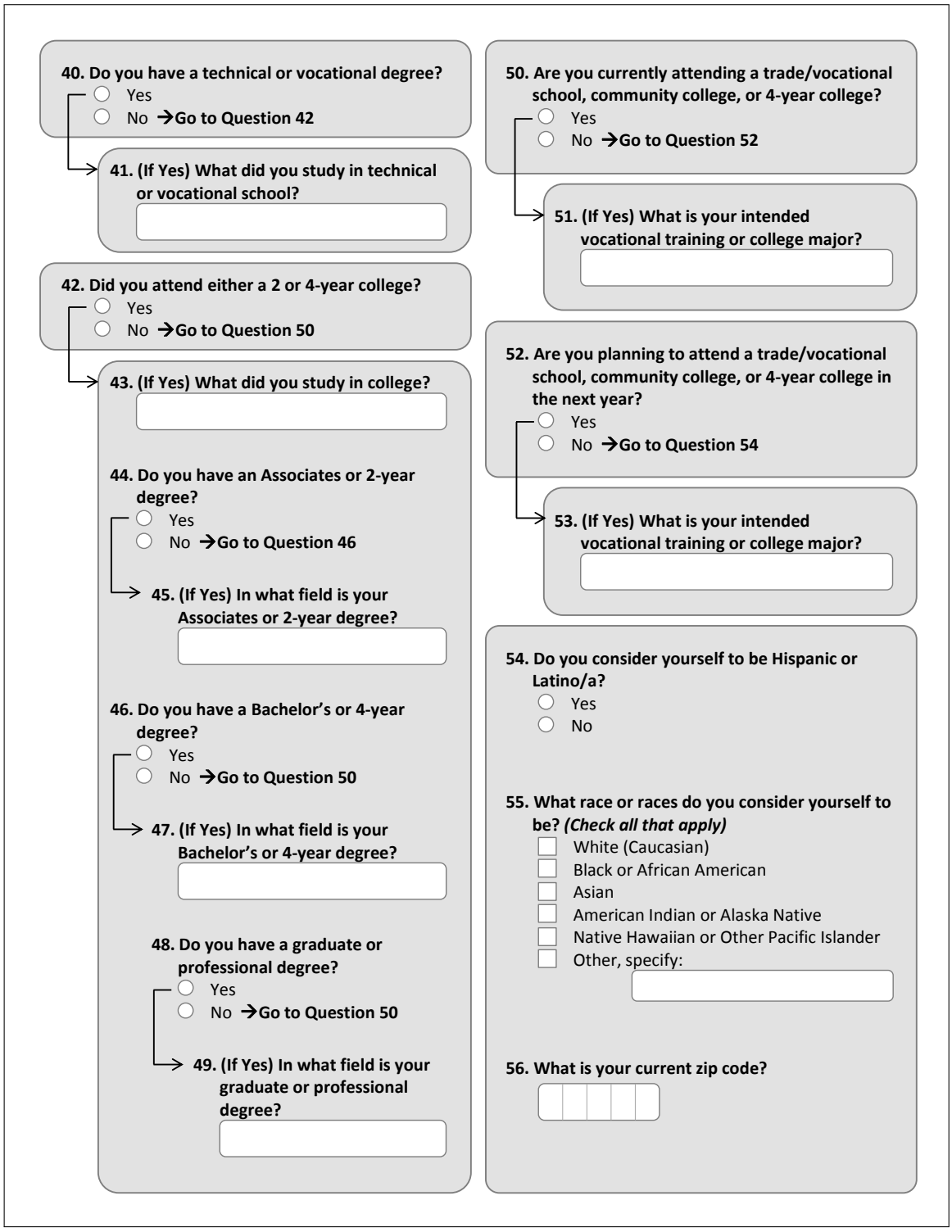
36. What is your current marital or relationship status?
- ○ Married
- ○ Married, living apart
- ○ Unmarried partner (cohabiting)
- ○ Never married
- ○ Divorced
- ○ Widowed
- ○ Separated

37. Including yourself, how many adults age 19 and older live in your household?
☐☐ Number of adults (age 19 and older)

38. How many children ages:
(Please write "0" if none.)
- a. 5 and younger live in your household? ☐☐
- b. 6 to 12 live in your household? ☐☐
- c. 13 to 18 live in your household? ☐☐

39. Are you a high school graduate or do you have a GED?
- ○ Yes
- ○ No

Labor Survey: Enclosure and Indentation Form, Page 7



Labor Survey: Enclosure and Indentation Form, Page 8

Please use the space below to provide any comments or feedback.

Thank you!

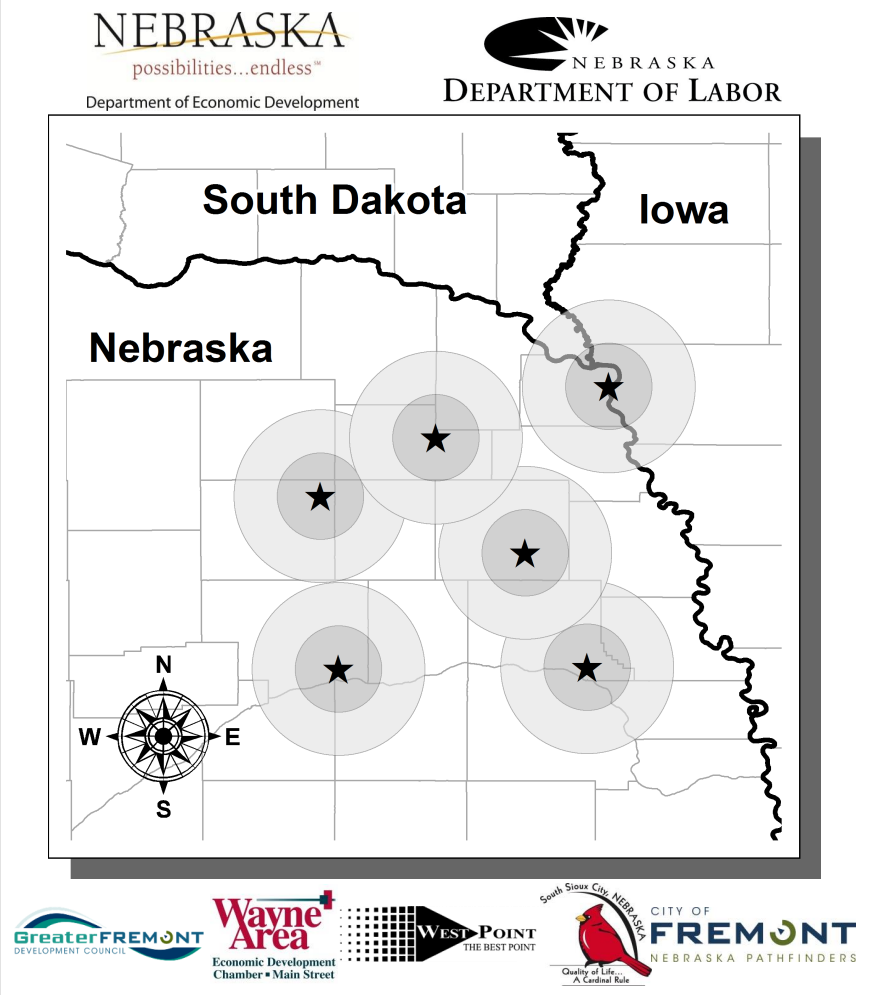
That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

Questions or requests from this survey can be directed to:
Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

Appendix G: Labor Survey: Enclosure and Sub-Numbering Form

Workforce Study of Northeast Nebraska



Bureau of Sociological Research
University of Nebraska-Lincoln

Labor Survey: Enclosure and Sub-Numbering Form, Page 2

Section 1. Employment Status

1. Which of the following best describes your employment status?

- ○ Employed
- ○ Unemployed
- ○ Retired
- ○ Homemaker

Go to Section 2

1a. Are you self-employed?

- ○ Yes
- ○ No

1b. Do you work for more than one employer (including yourself if self-employed)?

- ○ Yes
- ○ No →**Go to Section 3**

1c. (If Yes) Including yourself if you are self-employed, how many employers do you work for?

☐☐ Number of employers (including self)

1d. About how many hours do you work a week at all jobs?

☐☐ Number of hours per week

1e. What is the main reason you work multiple jobs?

- ○ Additional income
- ○ Benefits
- ○ Personal fulfillment
- ○ Other, specify: ☐

Go to Section 3

Section 2. Unemployed, Retired, and Homemaker Employment Overview

The following questions ask for information about your past employment. Please give answers for your most recent position at your primary employer—the job for which you received the bulk of your pay.

2. What was your job title at your primary employer?

☐

3. Describe your main duties and skills used at your primary employer.

☐

4. About how many hours did you work a week, at your primary employer?

☐☐ Number of hours per week

5. What was your pay per hour or yearly salary at your primary employer?

$☐☐.☐☐ per hour

OR

$☐☐☐,☐☐☐ per year

6. What were the city, zip code, and county of your primary employer?

☐ City

☐☐☐☐☐ Zip Code

☐ County

Labor Survey: Enclosure and Sub-Numbering Form, Page 3

7. In what industry was your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

8. Are you currently seeking work or looking to reenter the labor force in the next year?

- ○ Yes **→Go to Question 19**
- ○ No **→Go to Question 25**

Section 3. Current Employment Overview

The following questions ask for information about your current employment. If you work multiple jobs, the questions refer to your primary employer—the job for which you receive the bulk of your pay.

9. What is your job title at your primary employer?

_____

10. Describe your main duties and skills used at your primary employer.

_____

11. About how many hours do you work a week, at your primary employer?

_____ Number of hours per week

12. At your primary employer is your employment permanent, temporary, or seasonal?

- ○ Permanent
- ○ Temporary
- ○ Seasonal

13. What is your pay per hour or yearly salary at your primary employer?

$_____._____ per hour

OR

$_____,_____ per year

14. What are the city, zip code, and county of your primary employer?

_____ City

_____ Zip Code

_____ County

Labor Survey: Enclosure and Sub-Numbering Form, Page 4

15. In what industry is your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify:

16. How many years and months have you worked for your primary employer?

☐☐ Years AND ☐☐ Months

17. What kind of transportation do you use to get to your primary job?

- ○ Only work at home →**Go to Question 18**
- ○ Drive alone
- ○ Carpool
- ○ Walk
- ○ Bike
- ○ Other, specify:

17a. How long does it take you to travel one way to work at your primary job?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

17b. How satisfied or dissatisfied are you with the length of your commute?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

17c. Please explain your satisfaction or dissatisfaction with the length of your commute.

18. Please indicate whether or not you receive each of the following benefits at your primary employer.

	Yes	No
a. Health insurance	○	○
b. Dental insurance	○	○
c. Vision insurance	○	○
d. Retirement	○	○
e. Paid vacation	○	○
f. Paid holidays	○	○
g. Paid sick leave	○	○
h. Tuition reimbursement	○	○
i. Other	○	○

Labor Survey: Enclosure and Sub-Numbering Form, Page 5

Section 4. Future Employment

19. Below are several items that may or may not be important when choosing to improve your employment situation. Please indicate how important each item is to your decision to change or reenter employment.

	Not at all important	Somewhat important	Important	Very important
a. Salary	○	○	○	○
b. Commuting distance	○	○	○	○
c. Work schedule that fits my needs	○	○	○	○
d. Health insurance	○	○	○	○
e. Dental insurance	○	○	○	○
f. Vision insurance	○	○	○	○
g. Retirement benefits	○	○	○	○
h. Paid vacation	○	○	○	○
i. Paid holidays	○	○	○	○
j. Paid sick leave	○	○	○	○
k. Tuition reimbursement	○	○	○	○
l. Accessible childcare	○	○	○	○
m. Opportunity for advancement	○	○	○	○
n. Use skills you have	○	○	○	○
o. Level of responsibilities	○	○	○	○
p. Work from home/telecommuting	○	○	○	○
q. Learn new skills	○	○	○	○

20. If a job were available that met your most important criteria, what is the minimum pay you would require to improve your employment situation?

$ ☐☐☐.☐☐ per hour

OR

$ ☐☐☐,☐☐☐ per year

21. What is the maximum commute you would accept in order to improve your employment situation?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

22. Would you be willing to retrain or learn skills that may improve your employment situation?

- ○ Yes
- ○ No

23. How likely or unlikely are you to change jobs or reenter the workforce in the next year if a suitable job is available?

- ○ Very likely
- ○ Likely
- ○ Neither likely nor unlikely
- ○ Unlikely
- ○ Very unlikely

Labor Survey: Enclosure and Sub-Numbering Form, Page 6

24. Please indicate whether or not each of the following obstacles may prevent you from changing your job or reentering the workforce in the next year.

	Yes	No
a. Transportation	○	○
b. Lack of childcare	○	○
c. Lack of education	○	○
d. Lack of training	○	○
e. Criminal record	○	○
f. Employment history	○	○
g. Poor credit	○	○
h. No job experience	○	○
i. Language barriers	○	○
j. Family commitments	○	○
k. Overqualified	○	○
l. Disability	○	○
m. Inadequate pay offered at area employers	○	○
n. Inadequate benefits at area employers	○	○
o. Inadequate hours offered at area employers	○	○
p. Lack of job opportunities in the area	○	○
q. Contractual commitments	○	○
r. Other, specify:	○	○

Section 5. About You

25. What is your gender?
- ○ Female
- ○ Male

26. In what year were you born?
1 9 ☐ ☐

27. Are you a military veteran?
- ○ Yes
- ○ No

28. What is your current marital or relationship status?
- ○ Married
- ○ Married, living apart
- ○ Unmarried partner (cohabiting)
- ○ Never married
- ○ Divorced
- ○ Widowed
- ○ Separated

29. Including yourself, how many adults age 19 and older live in your household?
☐☐ Number of adults (age 19 and older)

30. How many children ages:
(Please write "0" if none.)
- a. 5 and younger live in your household? ☐☐
- b. 6 to 12 live in your household? ☐☐
- c. 13 to 18 live in your household? ☐☐

31. Are you a high school graduate or do you have a GED?
- ○ Yes
- ○ No

Labor Survey: Enclosure and Sub-Numbering Form, Page 7

32. Do you have a technical or vocational degree?
- ○ Yes
- ○ No →**Go to Question 33**

32a. (If Yes) What did you study in technical or vocational school?

33. Did you attend either a 2 or 4-year college?
- ○ Yes
- ○ No →**Go to Question 34**

33a. (If Yes) What did you study in college?

33b. Do you have an Associates or 2-year degree?
- ○ Yes
- ○ No →**Go to Question 33d**

33c. (If Yes) In what field is your Associates or 2-year degree?

33d. Do you have a Bachelor's or 4-year degree?
- ○ Yes
- ○ No →**Go to Question 34**

33e. (If Yes) In what field is your Bachelor's or 4-year degree?

33f. Do you have a graduate or professional degree?
- ○ Yes
- ○ No →**Go to Question 34**

33g. (If Yes) In what field is your graduate or professional degree?

34. Are you currently attending a trade/vocational school, community college, or 4-year college?
- ○ Yes
- ○ No →**Go to Question 35**

34a. (If Yes) What is your intended vocational training or college major?

35. Are you planning to attend a trade/vocational school, community college, or 4-year college in the next year?
- ○ Yes
- ○ No →**Go to Question 36**

35a. (If Yes) What is your intended vocational training or college major?

36. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

37. What race or races do you consider yourself to be? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, specify:

38. What is your current zip code?

Labor Survey: Enclosure and Sub-Numbering Form, Page 8

Please use the space below to provide any comments or feedback.

Thank you!

That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

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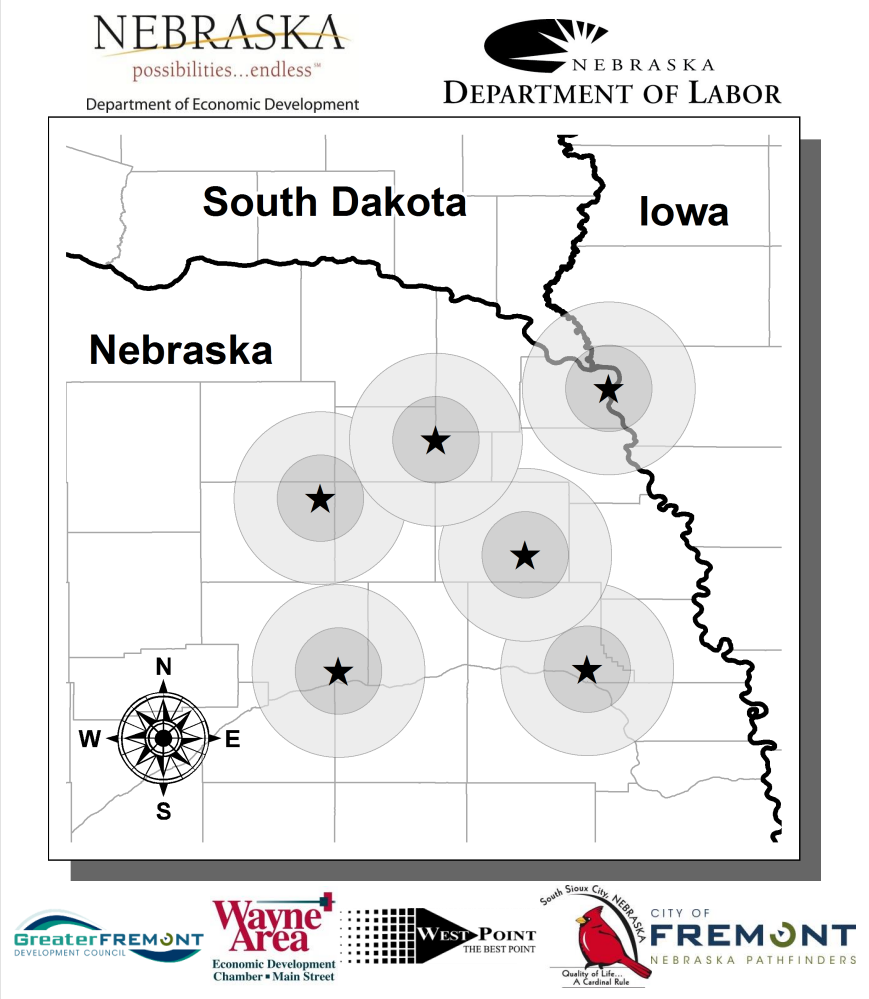
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

Appendix H: Labor Survey: Indentation and Sub-Numbering Form

Workforce Study of Northeast Nebraska



Bureau of Sociological Research
University of Nebraska-Lincoln

Labor Survey: Indentation and Sub-Numbering Form, Page 2

Section 1. Employment Status

1. Which of the following best describes your employment status?

- ○ Employed
- ○ Unemployed
- ○ Retired
- ○ Homemaker

Go to Section 2

1a. Are you self-employed?

- ○ Yes
- ○ No

1b. Do you work for more than one employer (including yourself if self-employed)?

- ○ Yes
- ○ No →**Go to Section 3**

1c. (If Yes) Including yourself if you are self-employed, how many employers do you work for?

☐☐ Number of employers (including self)

1d. About how many hours do you work a week at all jobs?

☐☐ Number of hours per week

1e. What is the main reason you work multiple jobs?

- ○ Additional income
- ○ Benefits
- ○ Personal fulfillment
- ○ Other, specify:

Go to Section 3

Section 2. Unemployed, Retired, and Homemaker Employment Overview

The following questions ask for information about your past employment. Please give answers for your most recent position at your primary employer—the job for which you received the bulk of your pay.

2. What was your job title at your primary employer?

3. Describe your main duties and skills used at your primary employer.

4. About how many hours did you work a week, at your primary employer?

☐☐ Number of hours per week

5. What was your pay per hour or yearly salary at your primary employer?

$☐☐.☐☐ per hour

OR

$☐☐☐,☐☐☐ per year

6. What were the city, zip code, and county of your primary employer?

City

☐☐☐☐☐ Zip Code

County

Labor Survey: Indentation and Sub-Numbering Form, Page 3

7. In what industry was your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

8. Are you currently seeking work or looking to reenter the labor force in the next year?

- ○ Yes →**Go to Question 19**
- ○ No →**Go to Question 25**

Section 3. Current Employment Overview

The following questions ask for information about your current employment. If you work multiple jobs, the questions refer to your primary employer—the job for which you receive the bulk of your pay.

9. What is your job title at your primary employer?

_____

10. Describe your main duties and skills used at your primary employer.

_____

11. About how many hours do you work a week, at your primary employer?

_____ Number of hours per week

12. At your primary employer is your employment permanent, temporary, or seasonal?

- ○ Permanent
- ○ Temporary
- ○ Seasonal

13. What is your pay per hour or yearly salary at your primary employer?

$_____.____ per hour

OR

$_____,____ per year

14. What are the city, zip code, and county of your primary employer?

_____ City

_____ Zip Code

_____ County

Labor Survey: Indentation and Sub-Numbering Form, Page 4

15. In what industry is your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify:

16. How many years and months have you worked for your primary employer?

☐☐ Years AND ☐☐ Months

17. What kind of transportation do you use to get to your primary job?

- ○ Only work at home →**Go to Question 18**
- ○ Drive alone
- ○ Carpool
- ○ Walk
- ○ Bike
- ○ Other, specify:

17a. How long does it take you to travel one way to work at your primary job?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

17b. How satisfied or dissatisfied are you with the length of your commute?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

17c. Please explain your satisfaction or dissatisfaction with the length of your commute.

18. Please indicate whether or not you receive each of the following benefits at your primary employer.

	Yes	No
a. Health insurance	○	○
b. Dental insurance	○	○
c. Vision insurance	○	○
d. Retirement	○	○
e. Paid vacation	○	○
f. Paid holidays	○	○
g. Paid sick leave	○	○
h. Tuition reimbursement	○	○
i. Other	○	○

Labor Survey: Indentation and Sub-Numbering Form, Page 5

Section 4. Future Employment

19. Below are several items that may or may not be important when choosing to improve your employment situation. Please indicate how important each item is to your decision to change or reenter employment.

	Not at all important	Somewhat important	Important	Very important
a. Salary	○	○	○	○
b. Commuting distance	○	○	○	○
c. Work schedule that fits my needs	○	○	○	○
d. Health insurance	○	○	○	○
e. Dental insurance	○	○	○	○
f. Vision insurance	○	○	○	○
g. Retirement benefits	○	○	○	○
h. Paid vacation	○	○	○	○
i. Paid holidays	○	○	○	○
j. Paid sick leave	○	○	○	○
k. Tuition reimbursement	○	○	○	○
l. Accessible childcare	○	○	○	○
m. Opportunity for advancement	○	○	○	○
n. Use skills you have	○	○	○	○
o. Level of responsibilities	○	○	○	○
p. Work from home/telecommuting	○	○	○	○
q. Learn new skills	○	○	○	○

20. If a job were available that met your most important criteria, what is the minimum pay you would require to improve your employment situation?

$ ☐☐☐.☐☐ per hour

OR

$ ☐☐☐,☐☐☐ per year

21. What is the maximum commute you would accept in order to improve your employment situation?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

22. Would you be willing to retrain or learn skills that may improve your employment situation?

- ○ Yes
- ○ No

23. How likely or unlikely are you to change jobs or reenter the workforce in the next year if a suitable job is available?

- ○ Very likely
- ○ Likely
- ○ Neither likely nor unlikely
- ○ Unlikely
- ○ Very unlikely

Labor Survey: Indentation and Sub-Numbering Form, Page 6

24. Please indicate whether or not each of the following obstacles may prevent you from changing your job or reentering the workforce in the next year.

	Yes	No
a. Transportation	○	○
b. Lack of childcare	○	○
c. Lack of education	○	○
d. Lack of training	○	○
e. Criminal record	○	○
f. Employment history	○	○
g. Poor credit	○	○
h. No job experience	○	○
i. Language barriers	○	○
j. Family commitments	○	○
k. Overqualified	○	○
l. Disability	○	○
m. Inadequate pay offered at area employers	○	○
n. Inadequate benefits at area employers	○	○
o. Inadequate hours offered at area employers	○	○
p. Lack of job opportunities in the area	○	○
q. Contractual commitments	○	○
r. Other, specify:	○	○

Section 5. About You

25. What is your gender?

- ○ Female
- ○ Male

26. In what year were you born?

1 9 ☐ ☐

27. Are you a military veteran?

- ○ Yes
- ○ No

28. What is your current marital or relationship status?

- ○ Married
- ○ Married, living apart
- ○ Unmarried partner (cohabiting)
- ○ Never married
- ○ Divorced
- ○ Widowed
- ○ Separated

29. Including yourself, how many adults age 19 and older live in your household?

☐☐ Number of adults (age 19 and older)

30. How many children ages:
(Please write "0" if none.)

a. 5 and younger live in your household? ☐☐

b. 6 to 12 live in your household? ☐☐

c. 13 to 18 live in your household? ☐☐

31. Are you a high school graduate or do you have a GED?

- ○ Yes
- ○ No

Labor Survey: Indentation and Sub-Numbering Form, Page 7

32. Do you have a technical or vocational degree?
- ○ Yes
- ○ No →**Go to Question 33**

→ **32a. (If Yes) What did you study in technical or vocational school?**

33. Did you attend either a 2 or 4-year college?
- ○ Yes
- ○ No →**Go to Question 34**

→ **33a. (If Yes) What did you study in college?**

33b. Do you have an Associates or 2-year degree?
- ○ Yes
- ○ No →**Go to Question 33d**

→ **33c. (If Yes) In what field is your Associates or 2-year degree?**

33d. Do you have a Bachelor's or 4-year degree?
- ○ Yes
- ○ No →**Go to Question 34**

→ **33e. (If Yes) In what field is your Bachelor's or 4-year degree?**

33f. Do you have a graduate or professional degree?
- ○ Yes
- ○ No →**Go to Question 34**

→ **33g. (If Yes) In what field is your graduate or professional degree?**

34. Are you currently attending a trade/vocational school, community college, or 4-year college?
- ○ Yes
- ○ No →**Go to Question 35**

→ **34a. (If Yes) What is your intended vocational training or college major?**

35. Are you planning to attend a trade/vocational school, community college, or 4-year college in the next year?
- ○ Yes
- ○ No →**Go to Question36**

→ **35a. (If Yes) What is your intended vocational training or college major?**

36. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

37. What race or races do you consider yourself to be? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, specify:

38. What is your current zip code?

Labor Survey: Indentation and Sub-Numbering Form, Page 8

Please use the space below to provide any comments or feedback.

Thank you!

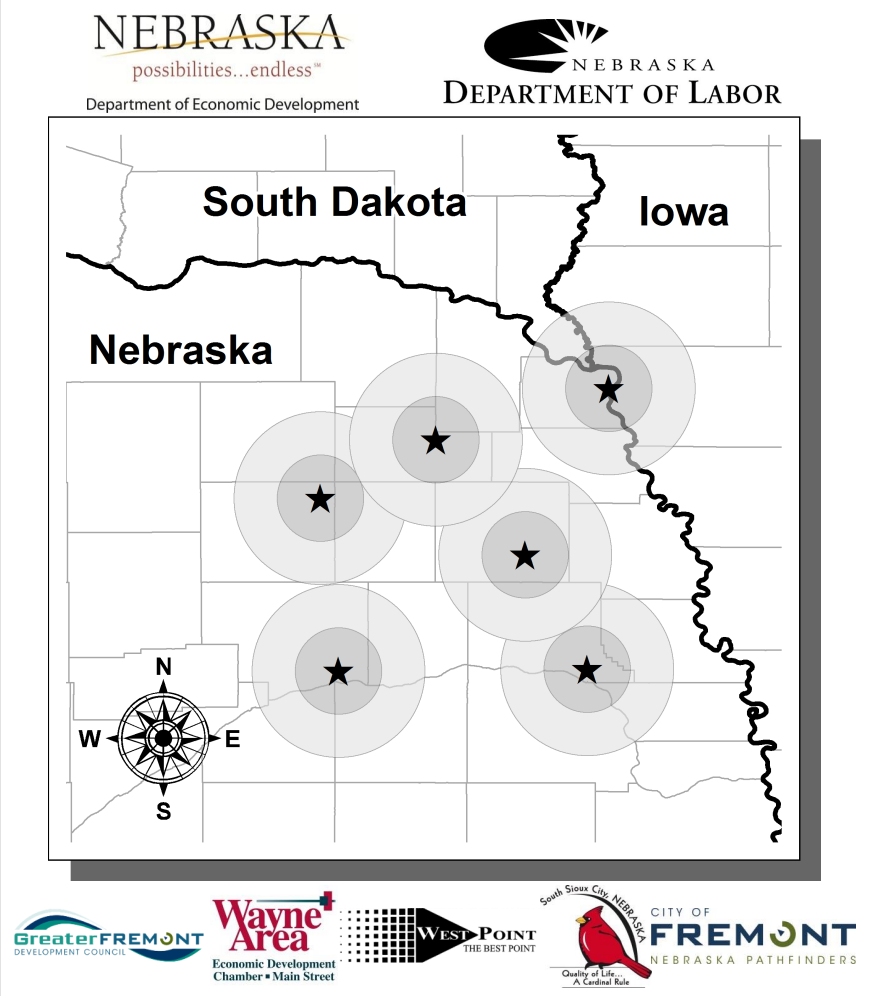
That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

Questions or requests from this survey can be directed to:
Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

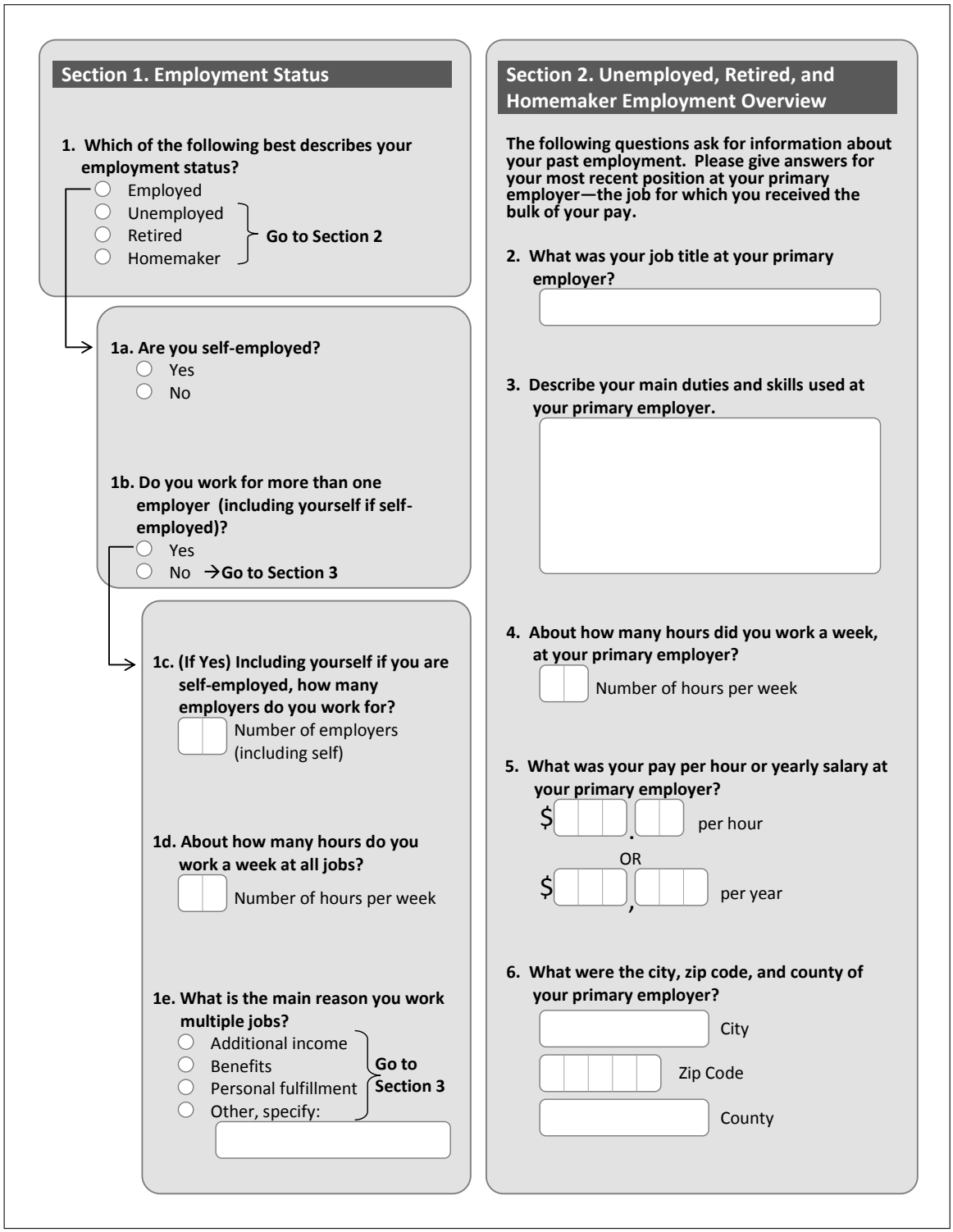
Appendix I: Labor Survey: Enclosure, Indentation and Sub-Numbering Form

Workforce Study of Northeast Nebraska



Bureau of Sociological Research
University of Nebraska-Lincoln

Labor Survey: Enclosure, Indentation and Sub-Numbering Form, Page 2



Labor Survey: Enclosure, Indentation and Sub-Numbering Form, Page 3

7. In what industry was your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify: _____

8. Are you currently seeking work or looking to reenter the labor force in the next year?

- ○ Yes →**Go to Question 19**
- ○ No →**Go to Question 25**

Section 3. Current Employment Overview

The following questions ask for information about your current employment. If you work multiple jobs, the questions refer to your primary employer—the job for which you receive the bulk of your pay.

9. What is your job title at your primary employer?

_____

10. Describe your main duties and skills used at your primary employer.

_____

11. About how many hours do you work a week, at your primary employer?

_____ Number of hours per week

12. At your primary employer is your employment permanent, temporary, or seasonal?

- ○ Permanent
- ○ Temporary
- ○ Seasonal

13. What is your pay per hour or yearly salary at your primary employer?

$_____._____ per hour

OR

$_____,_____ per year

14. What are the city, zip code, and county of your primary employer?

_____ City

_____ Zip Code

_____ County

Labor Survey: Enclosure, Indentation and Sub-Numbering Form, Page 4

15. In what industry is your primary employer?

- ○ Accommodation (e.g. Hotels & motels, RV parks, recreation camps)
- ○ Administrative & support services & waste management (e.g. Exterminators, sanitation services, temporary help agencies)
- ○ Agriculture (e.g. Farming, ranching, horse training)
- ○ Arts, entertainment & recreation (e.g. Performing arts, museums, zoos)
- ○ Construction (e.g. Carpentry, masonry, highway construction)
- ○ Education (e.g. Primary education, universities, test preparation services)
- ○ Finance, insurance, & real estate (e.g. Banks, investment brokerages, insurance agencies)
- ○ Food services & drinking places (e.g. Taverns, restaurants, caterers)
- ○ Government (e.g. Federal, state, & local government agencies, military branches)
- ○ Healthcare (e.g. Hospitals, nursing facilities, physician offices)
- ○ Information (e.g. Radio stations, publishing, data processing & hosting, software publishers)
- ○ Manufacturing (e.g. Food & beverage manufacturing, fabricated metal, sawmills)
- ○ Professional, scientific, & technical services (e.g. Law firms, CPAs, architecture firms, consultants)
- ○ Other services (e.g. Mechanics, dry cleaners, civic associations)
- ○ Retail trade & wholesale trade (e.g. Grocery stores, clothing stores, pharmaceutical reps)
- ○ Social assistance (e.g. Substance abuse centers, adoption agencies)
- ○ Transportation & warehousing (e.g. Postal service, railroads, refrigerated warehouses)
- ○ Utilities (e.g. Power Plants, Waste Treatment Plants)
- ○ Other, specify:

16. How many years and months have you worked for your primary employer?

☐☐ Years AND ☐☐ Months

17. What kind of transportation do you use to get to your primary job?

- ○ Only work at home →**Go to Question 18**
- ○ Drive alone
- ○ Carpool
- ○ Walk
- ○ Bike
- ○ Other, specify:

17a. How long does it take you to travel one way to work at your primary job?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

17b. How satisfied or dissatisfied are you with the length of your commute?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

17c. Please explain your satisfaction or dissatisfaction with the length of your commute.

18. Please indicate whether or not you receive each of the following benefits at your primary employer.

	Yes	No
a. Health insurance	○	○
b. Dental insurance	○	○
c. Vision insurance	○	○
d. Retirement	○	○
e. Paid vacation	○	○
f. Paid holidays	○	○
g. Paid sick leave	○	○
h. Tuition reimbursement	○	○
i. Other	○	○

Labor Survey: Enclosure, Indentation and Sub-Numbering Form, Page 5

Section 4. Future Employment

19. Below are several items that may or may not be important when choosing to improve your employment situation. Please indicate how important each item is to your decision to change or reenter employment.

	Not at all important	Somewhat important	Important	Very important
a. Salary	○	○	○	○
b. Commuting distance	○	○	○	○
c. Work schedule that fits my needs	○	○	○	○
d. Health insurance	○	○	○	○
e. Dental insurance	○	○	○	○
f. Vision insurance	○	○	○	○
g. Retirement benefits	○	○	○	○
h. Paid vacation	○	○	○	○
i. Paid holidays	○	○	○	○
j. Paid sick leave	○	○	○	○
k. Tuition reimbursement	○	○	○	○
l. Accessible childcare	○	○	○	○
m. Opportunity for advancement	○	○	○	○
n. Use skills you have	○	○	○	○
o. Level of responsibilities	○	○	○	○
p. Work from home/telecommuting	○	○	○	○
q. Learn new skills	○	○	○	○

20. If a job were available that met your most important criteria, what is the minimum pay you would require to improve your employment situation?

$ ☐☐☐.☐☐ per hour

OR

$ ☐☐☐,☐☐☐ per year

21. What is the maximum commute you would accept in order to improve your employment situation?

- ○ Less than 5 minutes
- ○ 5 to 14 minutes
- ○ 15 to 29 minutes
- ○ 30 to 44 minutes
- ○ 45 or more minutes

22. Would you be willing to retrain or learn skills that may improve your employment situation?

- ○ Yes
- ○ No

23. How likely or unlikely are you to change jobs or reenter the workforce in the next year if a suitable job is available?

- ○ Very likely
- ○ Likely
- ○ Neither likely nor unlikely
- ○ Unlikely
- ○ Very unlikely

Labor Survey: Enclosure, Indentation and Sub-Numbering Form, Page 6

24. Please indicate whether or not each of the following obstacles may prevent you from changing your job or reentering the workforce in the next year.

	Yes	No
a. Transportation	○	○
b. Lack of childcare	○	○
c. Lack of education	○	○
d. Lack of training	○	○
e. Criminal record	○	○
f. Employment history	○	○
g. Poor credit	○	○
h. No job experience	○	○
i. Language barriers	○	○
j. Family commitments	○	○
k. Overqualified	○	○
l. Disability	○	○
m. Inadequate pay offered at area employers	○	○
n. Inadequate benefits at area employers	○	○
o. Inadequate hours offered at area employers	○	○
p. Lack of job opportunities in the area	○	○
q. Contractual commitments	○	○
r. Other, specify:	○	○

Section 5. About You

25. What is your gender?
- ○ Female
- ○ Male

26. In what year were you born?

1 9 ☐ ☐

27. Are you a military veteran?
- ○ Yes
- ○ No

28. What is your current marital or relationship status?
- ○ Married
- ○ Married, living apart
- ○ Unmarried partner (cohabiting)
- ○ Never married
- ○ Divorced
- ○ Widowed
- ○ Separated

29. Including yourself, how many adults age 19 and older live in your household?

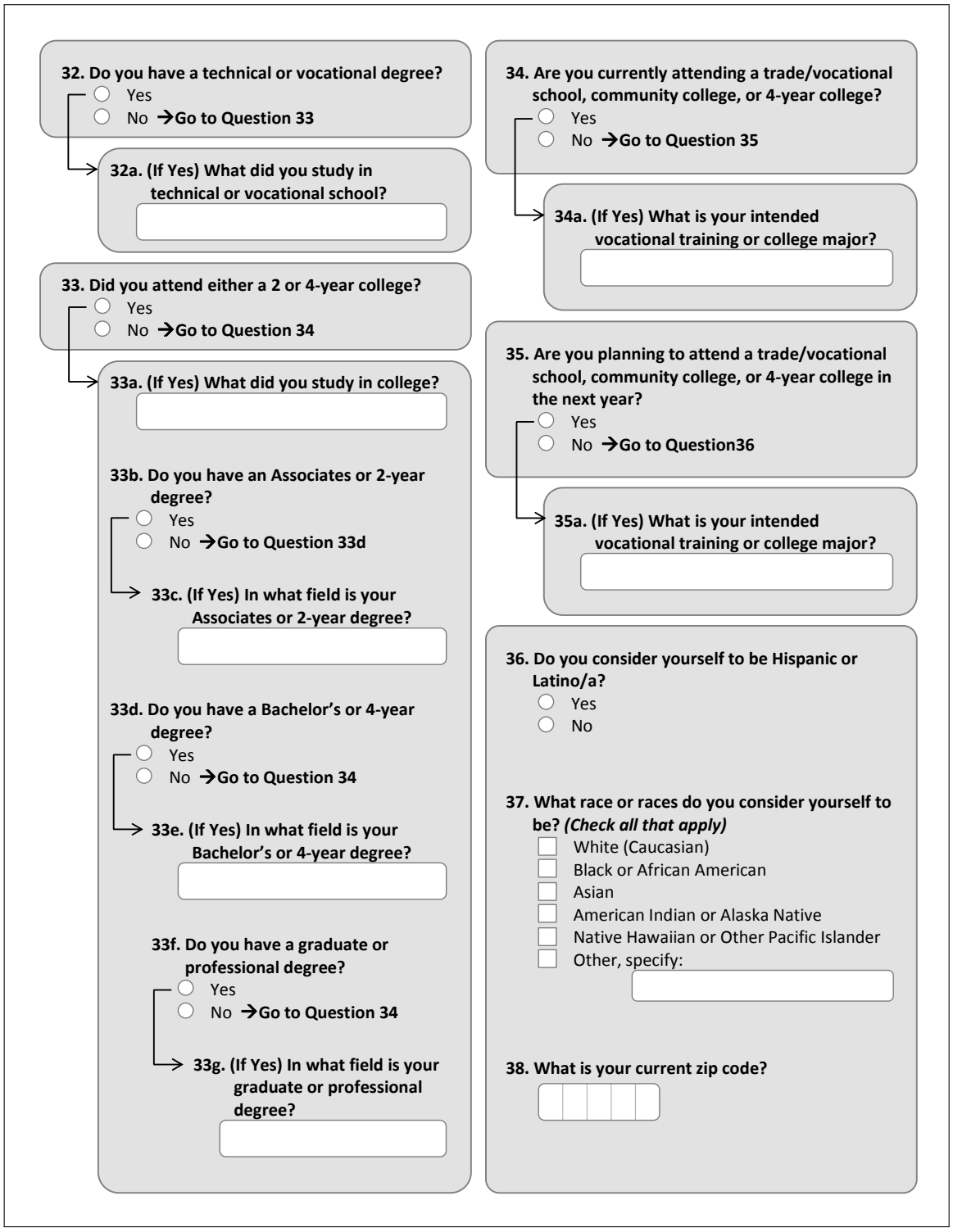
☐☐ Number of adults (age 19 and older)

30. How many children ages:
(Please write "0" if none.)

a. 5 and younger live in your household? ☐☐
b. 6 to 12 live in your household? ☐☐
c. 13 to 18 live in your household? ☐☐

31. Are you a high school graduate or do you have a GED?
- ○ Yes
- ○ No

Labor Survey: Enclosure, Indentation and Sub-Numbering Form, Page 7



Labor Survey: Enclosure, Indentation and Sub-Numbering Form, Page 8

Please use the space below to provide any comments or feedback.

Thank you!

That completes our questions. We greatly appreciate the time you have taken to complete this survey. For your convenience, please use the postage-paid return envelope included in your survey packet to return your questionnaire to the Bureau of Sociological Research.

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Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Phone: 1-800-480-4549 (toll free)
E-mail: bosr@unl.edu

Appendix J: UNL Survey: Control Form

UNL Community Connections

An effort to understand how the University of Nebraska—Lincoln impacts you and your community

Start Here

1. How satisfied or dissatisfied are you with the overall impact the University of Nebraska—Lincoln (UNL) has on your community?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

2. How well informed are you about events at UNL?

- ○ Very informed
- ○ Somewhat informed
- ○ A little informed

Go to 4

- ○ Not at all informed

3. (If not at all informed) Why are you not informed about events at UNL?

4. How would you rate the variety of events offered by UNL for the general public?

- ○ Excellent
- ○ Very good
- ○ Good
- ○ Fair
- ○ Poor

5. Please indicate whether or not you have ever attended each of the following events sponsored by UNL.

	Yes	No
Academic talks/lectures	○	○
Sporting events	○	○
Theater performances	○	○
Music performances	○	○
University of Nebraska State Museum (Morrill Hall) events	○	○
Other, please specify:	○	○

6. How important do you think it is for UNL to offer events for the general public?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

7. Do you favor or oppose the use of state tax revenue to support UNL?

- ○ Favor
- ○ Oppose

Education and Research

8. In your opinion, how important is a college degree to success in today's society?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

9. Do you have any children aged 18 or younger at home?

- ○ Yes
- ○ No → **Go to 12**

10. (If yes) Do you <u>think</u> your children will attend UNL to receive a college education?

- ○ Yes
- ○ No

11. Do you <u>want</u> your children to attend UNL to receive a college education?

- ○ Yes
- ○ No

12. How much do you agree or disagree that science and technology will provide more opportunities for the next generation?

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

UNL Survey: Control Form, Page 2

13. How much do you agree or disagree that scientific research at universities like UNL can help improve the US standing as a top scientific country?

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

14. In your opinion, how important is diversity of researchers to scientific research?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

15. People have frequently noted that scientific research has produced both benefits and harmful results. Overall, do you think that scientific research is beneficial or harmful?

- ○ Beneficial
- ○ Harmful
- ○ Don't Know

Go to 17

16. (If beneficial) Do you believe scientific research done at UNL directly benefits Nebraskans?

- ○ Yes
- ○ No

Univeristy Sports and Athletes

17. Please indicate whether or not you have ever attended each of the following UNL sporting events.

	Yes	No
Baseball	○	○
Men's Basketball	○	○
Women's Basketball	○	○
Bowling	○	○
Cross Country	○	○
Football	○	○
Men's Golf	○	○
Women's Golf	○	○
Men's Gymnastics	○	○
Women's Gymnastics	○	○
Rifle	○	○
Soccer	○	○
Softball	○	○
Swimming and Diving	○	○
Men's Tennis	○	○
Women's Tennis	○	○
Sand Volleyball	○	○
Track and Field	○	○
Volleyball	○	○
Wrestling	○	○

18. Do you follow any UNL sports teams (such as news, scores, etc.)?

- ○ Yes
- ○ No → **Go to 24**

19. (If yes) How satisfied or dissatisfied are you with Tim Miles as the men's basketball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

20. How satisfied or dissatisfied are you with Connie Yori as the women's basketball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

21. How satisfied or dissatisfied are you with John Cook as the volleyball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

22. How satisfied or dissatisfied are you with Bo Pelini as the football head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied

Go to 24

- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know → **Go to 24**

23. (If dissatisfied or very dissatisfied) What is the main reason you are dissatisfied with Bo Pelini?

- ○ Lack of championship game success
- ○ Sideline behavior
- ○ Season win-loss record
- ○ Press conference behavior
- ○ Other, please specify:

_____

UNL Survey: Control Form, Page 3

24. How much do you favor or oppose universities providing student-athletes with athletic scholarships?
- ○ Strongly favor
- ○ Favor
- ○ Neither favor nor oppose
- ○ Oppose
- ○ Strongly oppose

25. How much do you favor or oppose universities compensating student-athletes for their athletic performance with a salary and benefits, separate from athletic scholarships?
- ○ Strongly favor
- ○ Favor
- ○ Neither favor nor oppose
- ○ Oppose
- ○ Strongly oppose

26. Do you think the athletic performance of student-athletes qualifies them to be employees of their university?
- ○ Yes
- ○ No

27. In your opinion, should student-athletes have a players' union at their university?
- ○ Yes
- ○ No
- ○ Don't Know

About You

28. What is your sex?
- ○ Female
- ○ Male

29. In what year were you born?

1 9 _ _

30. What is your marital status?
- ○ Married
- ○ Never married
- ○ Widowed
- ○ Divorced
- ○ Separated

31. Including yourself, how many adults age 19 and older live in your household?

_ _ Number of adults (age 19 and older)

32. Please indicate whether or not you have each of the following types of reading material in your home.

	Yes	No
Fiction and literature books	○	○
Non-fiction books	○	○
Magazines	○	○
Newspapers	○	○

33. Please indicate if each of the following statements is true or false.

a. There are 25 or more books in your home right now.
- ○ True
- ○ False

b. There is a variety of magazines and other reading materials in your home.
- ○ True
- ○ False

34. What is the highest degree or level of school you have completed?
- ○ No diploma
- ○ High school diploma / G.E.D.

Go to 36

- ○ Some college, but no degree
- ○ Associate's degree
- ○ Bachelor's degree
- ○ Graduate degree

35. (If at least some college) Did you attend UNL?
- ○ Yes
- ○ No

36. With regard to the English language, how well do you understand it when it is spoken to you?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

37. With regard to the English language, how well do you read it?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

38. With regard to the English language, how well do you write it?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

UNL Survey: Control Form, Page 4

39. In general, how would you describe your political views?
- ○ Very liberal
- ○ Liberal
- ○ Middle-of-the-road
- ○ Conservative
- ○ Very conservative
- ○ Other, please specify:

40. In general, what do you consider yourself politically?
- ○ Democrat
- ○ Republican
- ○ Independent
- ○ Other, please specify:

41. Do you consider yourself to be Christian, Jewish, Muslim, or something else?
- ○ Christian
- ○ Jewish
- ○ Muslim
- ○ None (no religion)
- ○ Other, please specify:

Go to 43

42. (If Christian) Do you consider yourself to be Protestant, Catholic, or Other/Just Christian?
- ○ Protestant
- ○ Catholic
- ○ Other Christian / Just Christian

43. How religious are you?
- ○ Very religious
- ○ Somewhat religious
- ○ A little religious
- ○ Not at all religious

44. Do you approve or disapprove of labor unions?
- ○ Approve
- ○ Disapprove

45. Which income category describes your total family income in 2013?
- ○ Under $15,000
- ○ $15,000 – $24,999
- ○ $25,000 – $34,999
- ○ $35,000 – $49,999
- ○ $50,000 – $74,999
- ○ $75,000 – $99,999
- ○ $100,000 or more

46. What is your current employment status?
- ○ Employed
- ○ Unemployed
- ○ Student
- ○ Retired
- ○ Homemaker

Go to 48

47. (If employed) What is your current job title?

48. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

49. What is your race? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, please specify:

50. What is your current zip code?

Please use the space below to provide any comments.

Thank you!
Please return your survey in the enclosed envelope or use the following address:

Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Appendix K: UNL Survey: Enclosure Only Form

UNL Community Connections

An effort to understand how the University of Nebraska—Lincoln impacts you and your community

Start Here

1. How satisfied or dissatisfied are you with the overall impact the University of Nebraska—Lincoln (UNL) has on your community?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

2. How well informed are you about events at UNL?

- ○ Very informed
- ○ Somewhat informed
- ○ A little informed

Go to 4

- ○ Not at all informed

3. (If not at all informed) Why are you not informed about events at UNL?

4. How would you rate the variety of events offered by UNL for the general public?

- ○ Excellent
- ○ Very good
- ○ Good
- ○ Fair
- ○ Poor

5. Please indicate whether or not you have ever attended each of the following events sponsored by UNL.

	Yes	No
Academic talks/lectures	○	○
Sporting events	○	○
Theater performances	○	○
Music performances	○	○
University of Nebraska State Museum (Morrill Hall) events	○	○
Other, please specify:	○	○

6. How important do you think it is for UNL to offer events for the general public?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

7. Do you favor or oppose the use of state tax revenue to support UNL?

- ○ Favor
- ○ Oppose

Education and Research

8. In your opinion, how important is a college degree to success in today's society?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

9. Do you have any children aged 18 or younger at home?

- ○ Yes
- ○ No → **Go to 12**

10. (If yes) Do you <u>think</u> your children will attend UNL to receive a college education?

- ○ Yes
- ○ No

11. Do you <u>want</u> your children to attend UNL to receive a college education?

- ○ Yes
- ○ No

12. How much do you agree or disagree that science and technology will provide more opportunities for the next generation?

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

UNL Survey: Enclosure Only Form, Page 2

13. How much do you agree or disagree that scientific research at universities like UNL can help improve the US standing as a top scientific country?

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

14. In your opinion, how important is diversity of researchers to scientific research?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

15. People have frequently noted that scientific research has produced both benefits and harmful results. Overall, do you think that scientific research is beneficial or harmful?

- ○ Beneficial
- ○ Harmful
- ○ Don't Know

Go to 17

16. (If beneficial) Do you believe scientific research done at UNL directly benefits Nebraskans?

- ○ Yes
- ○ No

Univeristy Sports and Athletes

17. Please indicate whether or not you have ever attended each of the following UNL sporting events.

	Yes	No
Baseball	○	○
Men's Basketball	○	○
Women's Basketball	○	○
Bowling	○	○
Cross Country	○	○
Football	○	○
Men's Golf	○	○
Women's Golf	○	○
Men's Gymnastics	○	○
Women's Gymnastics	○	○
Rifle	○	○
Soccer	○	○
Softball	○	○
Swimming and Diving	○	○
Men's Tennis	○	○
Women's Tennis	○	○
Sand Volleyball	○	○
Track and Field	○	○
Volleyball	○	○
Wrestling	○	○

18. Do you follow any UNL sports teams (such as news, scores, etc.)?

- ○ Yes
- ○ No → **Go to 24**

19. (If yes) How satisfied or dissatisfied are you with Tim Miles as the men's basketball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

20. How satisfied or dissatisfied are you with Connie Yori as the women's basketball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

21. How satisfied or dissatisfied are you with John Cook as the volleyball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

22. How satisfied or dissatisfied are you with Bo Pelini as the football head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied

Go to 24

- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know → **Go to 24**

23. (If dissatisfied or very dissatisfied) What is the main reason you are dissatisfied with Bo Pelini?

- ○ Lack of championship game success
- ○ Sideline behavior
- ○ Season win-loss record
- ○ Press conference behavior
- ○ Other, please specify:

UNL Survey: Enclosure Only Form, Page 3

24. How much do you favor or oppose universities providing student-athletes with athletic scholarships?
- ○ Strongly favor
- ○ Favor
- ○ Neither favor nor oppose
- ○ Oppose
- ○ Strongly oppose

25. How much do you favor or oppose universities compensating student-athletes for their athletic performance with a salary and benefits, separate from athletic scholarships?
- ○ Strongly favor
- ○ Favor
- ○ Neither favor nor oppose
- ○ Oppose
- ○ Strongly oppose

26. Do you think the athletic performance of student-athletes qualifies them to be employees of their university?
- ○ Yes
- ○ No

27. In your opinion, should student-athletes have a players' union at their university?
- ○ Yes
- ○ No
- ○ Don't Know

About You

28. What is your sex?
- ○ Female
- ○ Male

29. In what year were you born?

1 9 ☐ ☐

30. What is your marital status?
- ○ Married
- ○ Never married
- ○ Widowed
- ○ Divorced
- ○ Separated

31. Including yourself, how many adults age 19 and older live in your household?

☐☐ Number of adults (age 19 and older)

32. Please indicate whether or not you have each of the following types of reading material in your home.

	Yes	No
Fiction and literature books	○	○
Non-fiction books	○	○
Magazines	○	○
Newspapers	○	○

33. Please indicate if each of the following statements is true or false.

a. There are 25 or more books in your home right now.
- ○ True
- ○ False

b. There is a variety of magazines and other reading materials in your home.
- ○ True
- ○ False

34. What is the highest degree or level of school you have completed?
- ○ No diploma
- ○ High school diploma / G.E.D.

} **Go to 36**

- ○ Some college, but no degree
- ○ Associate's degree
- ○ Bachelor's degree
- ○ Graduate degree

35. (If at least some college) Did you attend UNL?
- ○ Yes
- ○ No

36. With regard to the English language, how well do you understand it when it is spoken to you?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

37. With regard to the English language, how well do you read it?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

38. With regard to the English language, how well do you write it?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

UNL Survey: Enclosure Only Form, Page 4

39. In general, how would you describe your political views?
- ○ Very liberal
- ○ Liberal
- ○ Middle-of-the-road
- ○ Conservative
- ○ Very conservative
- ○ Other, please specify:

40. In general, what do you consider yourself politically?
- ○ Democrat
- ○ Republican
- ○ Independent
- ○ Other, please specify:

41. Do you consider yourself to be Christian, Jewish, Muslim, or something else?
- ○ Christian
- ○ Jewish
- ○ Muslim
- ○ None (no religion)
- ○ Other, please specify:

Go to 43

42. (If Christian) Do you consider yourself to be Protestant, Catholic, or Other/Just Christian?
- ○ Protestant
- ○ Catholic
- ○ Other Christian / Just Christian

43. How religious are you?
- ○ Very religious
- ○ Somewhat religious
- ○ A little religious
- ○ Not at all religious

44. Do you approve or disapprove of labor unions?
- ○ Approve
- ○ Disapprove

45. Which income category describes your total family income in 2013?
- ○ Under $15,000
- ○ $15,000 – $24,999
- ○ $25,000 – $34,999
- ○ $35,000 – $49,999
- ○ $50,000 – $74,999
- ○ $75,000 – $99,999
- ○ $100,000 or more

46. What is your current employment status?
- ○ Employed
- ○ Unemployed
- ○ Student
- ○ Retired
- ○ Homemaker

Go to 48

47. (If employed) What is your current job title?

48. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

49. What is your race? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, please specify:

50. What is your current zip code?

Please use the space below to provide any comments.

Thank you!
Please return your survey in the enclosed envelope or use the following address:

Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Appendix L: UNL Survey: Indentation Only Form

UNL Community Connections

An effort to understand how the University of Nebraska—Lincoln impacts you and your community

Start Here

1. How satisfied or dissatisfied are you with the overall impact the University of Nebraska—Lincoln (UNL) has on your community?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

2. How well informed are you about events at UNL?

- ○ Very informed
- ○ Somewhat informed } **Go to 4**
- ○ A little informed
- ○ Not at all informed

→ **3. (If not at all informed) Why are you not informed about events at UNL?**

4. How would you rate the variety of events offered by UNL for the general public?

- ○ Excellent
- ○ Very good
- ○ Good
- ○ Fair
- ○ Poor

5. Please indicate whether or not you have ever attended each of the following events sponsored by UNL.

	Yes	No
Academic talks/lectures	○	○
Sporting events	○	○
Theater performances	○	○
Music performances	○	○
University of Nebraska State Museum (Morrill Hall) events	○	○
Other, please specify:	○	○

6. How important do you think it is for UNL to offer events for the general public?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

7. Do you favor or oppose the use of state tax revenue to support UNL?

- ○ Favor
- ○ Oppose

Education and Research

8. In your opinion, how important is a college degree to success in today's society?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

9. Do you have any children aged 18 or younger at home?

- ○ Yes
- ○ No → **Go to 12**

→ **10. (If yes) Do you <u>think</u> your children will attend UNL to receive a college education?**

- ○ Yes
- ○ No

11. Do you <u>want</u> your children to attend UNL to receive a college education?

- ○ Yes
- ○ No

12. How much do you agree or disagree that science and technology will provide more opportunities for the next generation?

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

UNL Survey: Indentation Only Form, Page 2

13. How much do you agree or disagree that scientific research at universities like UNL can help improve the US standing as a top scientific country?

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

14. In your opinion, how important is diversity of researchers to scientific research?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

15. People have frequently noted that scientific research has produced both benefits and harmful results. Overall, do you think that scientific research is beneficial or harmful?

- ○ Beneficial
- ○ Harmful
- ○ Don't Know

Go to 17

16. (If beneficial) Do you believe scientific research done at UNL directly benefits Nebraskans?

- ○ Yes
- ○ No

Univeristy Sports and Athletes

17. Please indicate whether or not you have ever attended each of the following UNL sporting events.

	Yes	No
Baseball	○	○
Men's Basketball	○	○
Women's Basketball	○	○
Bowling	○	○
Cross Country	○	○
Football	○	○
Men's Golf	○	○
Women's Golf	○	○
Men's Gymnastics	○	○
Women's Gymnastics	○	○
Rifle	○	○
Soccer	○	○
Softball	○	○
Swimming and Diving	○	○
Men's Tennis	○	○
Women's Tennis	○	○
Sand Volleyball	○	○
Track and Field	○	○
Volleyball	○	○
Wrestling	○	○

18. Do you follow any UNL sports teams (such as news, scores, etc.)?

- ○ Yes
- ○ No → **Go to 24**

19. (If yes) How satisfied or dissatisfied are you with Tim Miles as the men's basketball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

20. How satisfied or dissatisfied are you with Connie Yori as the women's basketball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

21. How satisfied or dissatisfied are you with John Cook as the volleyball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

22. How satisfied or dissatisfied are you with Bo Pelini as the football head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied

Go to 24

- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know → **Go to 24**

23. (If dissatisfied or very dissatisfied) What is the main reason you are dissatisfied with Bo Pelini?

- ○ Lack of championship game success
- ○ Sideline behavior
- ○ Season win-loss record
- ○ Press conference behavior
- ○ Other, please specify:

UNL Survey: Indentation Only Form, Page 3

24. How much do you favor or oppose universities providing student-athletes with athletic scholarships?
- ○ Strongly favor
- ○ Favor
- ○ Neither favor nor oppose
- ○ Oppose
- ○ Strongly oppose

25. How much do you favor or oppose universities compensating student-athletes for their athletic performance with a salary and benefits, separate from athletic scholarships?
- ○ Strongly favor
- ○ Favor
- ○ Neither favor nor oppose
- ○ Oppose
- ○ Strongly oppose

26. Do you think the athletic performance of student-athletes qualifies them to be employees of their university?
- ○ Yes
- ○ No

27. In your opinion, should student-athletes have a players' union at their university?
- ○ Yes
- ○ No
- ○ Don't Know

About You

28. What is your sex?
- ○ Female
- ○ Male

29. In what year were you born?

1 9 ☐ ☐

30. What is your marital status?
- ○ Married
- ○ Never married
- ○ Widowed
- ○ Divorced
- ○ Separated

31. Including yourself, how many adults age 19 and older live in your household?

☐☐ Number of adults (age 19 and older)

32. Please indicate whether or not you have each of the following types of reading material in your home.

	Yes	No
Fiction and literature books	○	○
Non-fiction books	○	○
Magazines	○	○
Newspapers	○	○

33. Please indicate if each of the following statements is true or false.

a. There are 25 or more books in your home right now.
- ○ True
- ○ False

b. There is a variety of magazines and other reading materials in your home.
- ○ True
- ○ False

34. What is the highest degree or level of school you have completed?
- ○ No diploma
- ○ High school diploma / G.E.D. } **Go to 36**
- ○ Some college, but no degree
- ○ Associate's degree
- ○ Bachelor's degree
- ○ Graduate degree

→ **35. (If at least some college) Did you attend UNL?**
- ○ Yes
- ○ No

36. With regard to the English language, how well do you understand it when it is spoken to you?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

37. With regard to the English language, how well do you read it?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

38. With regard to the English language, how well do you write it?
- ○ Very well
- ○ Well
- ○ Not well
- ○ Not at all

UNL Survey: Indentation Only Form, Page 4

39. In general, how would you describe your political views?
- ○ Very liberal
- ○ Liberal
- ○ Middle-of-the-road
- ○ Conservative
- ○ Very conservative
- ○ Other, please specify:

40. In general, what do you consider yourself politically?
- ○ Democrat
- ○ Republican
- ○ Independent
- ○ Other, please specify:

41. Do you consider yourself to be Christian, Jewish, Muslim, or something else?
- ○ Christian
- ○ Jewish
- ○ Muslim
- ○ None (no religion)
- ○ Other, please specify:

Go to 43

42. (If Christian) Do you consider yourself to be Protestant, Catholic, or Other/Just Christian?
- ○ Protestant
- ○ Catholic
- ○ Other Christian / Just Christian

43. How religious are you?
- ○ Very religious
- ○ Somewhat religious
- ○ A little religious
- ○ Not at all religious

44. Do you approve or disapprove of labor unions?
- ○ Approve
- ○ Disapprove

45. Which income category describes your total family income in 2013?
- ○ Under $15,000
- ○ $15,000 – $24,999
- ○ $25,000 – $34,999
- ○ $35,000 – $49,999
- ○ $50,000 – $74,999
- ○ $75,000 – $99,999
- ○ $100,000 or more

46. What is your current employment status?
- ○ Employed
- ○ Unemployed
- ○ Student
- ○ Retired
- ○ Homemaker

Go to 48

47. (If employed) What is your current job title?

48. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

49. What is your race? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, please specify:

50. What is your current zip code?

Please use the space below to provide any comments.

Thank you!
Please return your survey in the enclosed envelope or use the following address:

Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Appendix M: UNL Survey: Enclosure and Indentation Form

UNL Community Connections

An effort to understand how the University of Nebraska—Lincoln impacts you and your community

Start Here

1. How satisfied or dissatisfied are you with the overall impact the University of Nebraska—Lincoln (UNL) has on your community?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied

2. How well informed are you about events at UNL?

- ○ Very informed
- ○ Somewhat informed
- ○ A little informed

} **Go to 4**

- ○ Not at all informed

3. (If not at all informed) Why are you not informed about events at UNL?

4. How would you rate the variety of events offered by UNL for the general public?

- ○ Excellent
- ○ Very good
- ○ Good
- ○ Fair
- ○ Poor

5. Please indicate whether or not you have ever attended each of the following events sponsored by UNL.

	Yes	No
Academic talks/lectures	○	○
Sporting events	○	○
Theater performances	○	○
Music performances	○	○
University of Nebraska State Museum (Morrill Hall) events	○	○
Other, please specify:	○	○

6. How important do you think it is for UNL to offer events for the general public?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

7. Do you favor or oppose the use of state tax revenue to support UNL?

- ○ Favor
- ○ Oppose

Education and Research

8. In your opinion, how important is a college degree to success in today's society?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

9. Do you have any children aged 18 or younger at home?

- ○ Yes
- ○ No → **Go to 12**

10. (If yes) Do you <u>think</u> your children will attend UNL to receive a college education?

- ○ Yes
- ○ No

11. Do you <u>want</u> your children to attend UNL to receive a college education?

- ○ Yes
- ○ No

12. How much do you agree or disagree that science and technology will provide more opportunities for the next generation?

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

UNL Survey: Enclosure and Indentation Form, Page 2

13. How much do you agree or disagree that scientific research at universities like UNL can help improve the US standing as a top scientific country?

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

14. In your opinion, how important is diversity of researchers to scientific research?

- ○ Very important
- ○ Somewhat important
- ○ A little important
- ○ Not at all important

15. People have frequently noted that scientific research has produced both benefits and harmful results. Overall, do you think that scientific research is beneficial or harmful?

- ○ Beneficial
- ○ Harmful
- ○ Don't Know

Go to 17

16. (If beneficial) Do you believe scientific research done at UNL directly benefits Nebraskans?

- ○ Yes
- ○ No

Univeristy Sports and Athletes

17. Please indicate whether or not you have ever attended each of the following UNL sporting events.

	Yes	No
Baseball	○	○
Men's Basketball	○	○
Women's Basketball	○	○
Bowling	○	○
Cross Country	○	○
Football	○	○
Men's Golf	○	○
Women's Golf	○	○
Men's Gymnastics	○	○
Women's Gymnastics	○	○
Rifle	○	○
Soccer	○	○
Softball	○	○
Swimming and Diving	○	○
Men's Tennis	○	○
Women's Tennis	○	○
Sand Volleyball	○	○
Track and Field	○	○
Volleyball	○	○
Wrestling	○	○

18. Do you follow any UNL sports teams (such as news, scores, etc.)?

- ○ Yes
- ○ No → **Go to 24**

19. (If yes) How satisfied or dissatisfied are you with Tim Miles as the men's basketball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

20. How satisfied or dissatisfied are you with Connie Yori as the women's basketball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

21. How satisfied or dissatisfied are you with John Cook as the volleyball head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied
- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know

22. How satisfied or dissatisfied are you with Bo Pelini as the football head coach?

- ○ Very satisfied
- ○ Satisfied
- ○ Neither satisfied nor dissatisfied

Go to 24

- ○ Dissatisfied
- ○ Very dissatisfied
- ○ Don't Know → **Go to 24**

23. (If dissatisfied or very dissatisfied) What is the main reason you are dissatisfied with Bo Pelini?

- ○ Lack of championship game success
- ○ Sideline behavior
- ○ Season win-loss record
- ○ Press conference behavior
- ○ Other, please specify:

_____

UNL Survey: Enclosure and Indentation Form, Page 3

24. How much do you favor or oppose universities providing student-athletes with athletic scholarships?
- ◯ Strongly favor
- ◯ Favor
- ◯ Neither favor nor oppose
- ◯ Oppose
- ◯ Strongly oppose

25. How much do you favor or oppose universities compensating student-athletes for their athletic performance with a salary and benefits, separate from athletic scholarships?
- ◯ Strongly favor
- ◯ Favor
- ◯ Neither favor nor oppose
- ◯ Oppose
- ◯ Strongly oppose

26. Do you think the athletic performance of student-athletes qualifies them to be employees of their university?
- ◯ Yes
- ◯ No

27. In your opinion, should student-athletes have a players' union at their university?
- ◯ Yes
- ◯ No
- ◯ Don't Know

About You

28. What is your sex?
- ◯ Female
- ◯ Male

29. In what year were you born?

1 9 ☐ ☐

30. What is your marital status?
- ◯ Married
- ◯ Never married
- ◯ Widowed
- ◯ Divorced
- ◯ Separated

31. Including yourself, how many adults age 19 and older live in your household?

☐☐ Number of adults (age 19 and older)

32. Please indicate whether or not you have each of the following types of reading material in your home.

	Yes	No
Fiction and literature books	◯	◯
Non-fiction books	◯	◯
Magazines	◯	◯
Newspapers	◯	◯

33. Please indicate if each of the following statements is true or false.

a. There are 25 or more books in your home right now.
- ◯ True
- ◯ False

b. There is a variety of magazines and other reading materials in your home.
- ◯ True
- ◯ False

34. What is the highest degree or level of school you have completed?
- ◯ No diploma
- ◯ High school diploma / G.E.D. — **Go to 36**
- ◯ Some college, but no degree
- ◯ Associate's degree
- ◯ Bachelor's degree
- ◯ Graduate degree

35. (If at least some college) Did you attend UNL?
- ◯ Yes
- ◯ No

36. With regard to the English language, how well do you understand it when it is spoken to you?
- ◯ Very well
- ◯ Well
- ◯ Not well
- ◯ Not at all

37. With regard to the English language, how well do you read it?
- ◯ Very well
- ◯ Well
- ◯ Not well
- ◯ Not at all

38. With regard to the English language, how well do you write it?
- ◯ Very well
- ◯ Well
- ◯ Not well
- ◯ Not at all

UNL Survey: Enclosure and Indentation Form, Page 4

39. In general, how would you describe your political views?
- ○ Very liberal
- ○ Liberal
- ○ Middle-of-the-road
- ○ Conservative
- ○ Very conservative
- ○ Other, please specify:

40. In general, what do you consider yourself politically?
- ○ Democrat
- ○ Republican
- ○ Independent
- ○ Other, please specify:

41. Do you consider yourself to be Christian, Jewish, Muslim, or something else?
- ○ Christian
- ○ Jewish
- ○ Muslim
- ○ None (no religion)
- ○ Other, please specify:

Go to 43

42. (If Christian) Do you consider yourself to be Protestant, Catholic, or Other/Just Christian?
- ○ Protestant
- ○ Catholic
- ○ Other Christian / Just Christian

43. How religious are you?
- ○ Very religious
- ○ Somewhat religious
- ○ A little religious
- ○ Not at all religious

44. Do you approve or disapprove of labor unions?
- ○ Approve
- ○ Disapprove

45. Which income category describes your total family income in 2013?
- ○ Under $15,000
- ○ $15,000 – $24,999
- ○ $25,000 – $34,999
- ○ $35,000 – $49,999
- ○ $50,000 – $74,999
- ○ $75,000 – $99,999
- ○ $100,000 or more

46. What is your current employment status?
- ○ Employed
- ○ Unemployed
- ○ Student
- ○ Retired
- ○ Homemaker

Go to 48

47. (If employed) What is your current job title?

48. Do you consider yourself to be Hispanic or Latino/a?
- ○ Yes
- ○ No

49. What is your race? *(Check all that apply)*
- ☐ White (Caucasian)
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Other, please specify:

50. What is your current zip code?

Please use the space below to provide any comments.

Thank you!
Please return your survey in the enclosed envelope or use the following address.

Bureau of Sociological Research
University of Nebraska-Lincoln
301 Benton Hall
PO Box 886102
Lincoln, NE 68588-6102

Appendix N: Percent of Errors by Treatment for Each Skip Pattern

N.1 Item Nonresponse to the Filter Question

Table N.1: Percent of respondents who had item nonresponse errors on the filter question for each skip pattern in the Labor survey across all treatments

Visual Design Elements	SP01	SP02	SP03	SP04	SP05	SP06	SP07	SP08	SP09	SP10
Control Form: No Added Elements	2.13%	3.15%	13.06%	5.32%	3.72%	6.97%	2.99%	3.42%	2.39%	3.19%
Enclosure	3.25%	4.26%	10.21%	5.96%	3.79%	6.37%	1.96%	4.20%	3.25%	4.34%
Indentation	3.05%	3.33%	12.92%	4.83%	2.04%	9.25%	4.41%	1.50%	1.53%	1.78%
Sub-Numbering	2.41%	3.27%	15.89%	5.63%	7.24%	10.55%	3.52%	1.69%	2.41%	2.95%
Enclosure * Indentation	2.54%	3.95%	11.40%	5.08%	2.54%	5.79%	1.05%	4.67%	2.54%	2.82%
Enclosure * Sub-Numbering	1.57%	6.36%	16.95%	5.25%	7.61%	9.71%	3.88%	3.88%	3.41%	2.89%
Indentation * Sub-Numbering	2.24%	4.31%	20.00%	5.22%	7.46%	10.24%	2.93%	0.00%	1.99%	2.49%
Enclosure * Indentation * Sub-Numbering	2.51%	4.46%	12.50%	4.18%	8.36%	9.85%	3.45%	2.91%	3.62%	3.90%

Table N.2: Percent of respondents who had item nonresponse errors on the filter question for each skip pattern in the UNL survey across all treatments

Visual Design Elements	**SP01**	**SP02**	**SP03**	**SP04**	**SP05**	**SP06**	**SP07**	**SP08**
Control Form: No Added Elements	1.11%	1.11%	1.48%	1.48%	1.51%	0.74%	3.33%	1.85%
Enclosure	2.21%	1.47%	1.10%	2.21%	1.02%	0.00%	1.10%	0.74%
Indentation	2.25%	2.25%	1.12%	1.12%	1.46%	1.12%	0.37%	0.37%
Enclosure * Indentation	1.83%	0.37%	0.37%	1.10%	1.02%	0.00%	0.37%	0.00%

N.2 **Omission and Commission Errors on the Follow-up Questions**

Table N.3: Percent of respondents who had omission errors on the follow-up questions for each skip pattern in the Labor survey across all treatments

Visual Design Elements	**SP01**	**SP02**	**SP03**	**SP04**	**SP05**	**SP06**	**SP07**	**SP08**	**SP09**	**SP10**
Control Form: No Added Elements	1.54%	0.00%	1.44%	1.13%	1.24%	0.00%	0.00%	0.00%	0.00%	0.27%
Enclosure	0.61%	0.00%	0.44%	0.87%	0.62%	0.00%	1.06%	0.61%	0.00%	0.00%
Indentation	1.49%	0.00%	0.00%	2.95%	1.74%	1.75%	0.51%	1.03%	0.00%	0.00%
Sub-Numbering	1.47%	0.97%	1.05%	1.43%	1.03%	1.64%	0.57%	0.95%	0.00%	0.28%
Enclosure * Indentation	1.26%	0.44%	0.00%	2.99%	0.30%	3.08%	1.72%	0.00%	0.00%	0.00%
Enclosure * Sub-Numbering	2.37%	0.00%	0.99%	1.40%	0.63%	5.00%	0.54%	0.00%	0.00%	0.00%
Indentation * Sub-Numbering	1.91%	0.00%	0.47%	2.63%	1.00%	1.75%	0.00%	0.44%	0.25%	0.00%
Enclosure * Indentation * Sub-Numbering	1.55%	0.00%	1.46%	1.16%	1.91%	0.00%	0.00%	0.00%	0.00%	0.00%

Table N.4: Percent of respondents who had commission errors on the follow-up questions for each skip pattern in the Labor survey across all treatments

Visual Design Elements	**SP01**	**SP02**	**SP03**	**SP04**	**SP05**	**SP06**	**SP07**	**SP08**	**SP09**	**SP10**
Control Form: No Added Elements	12.12%	15.23%	0.48%	0.57%	11.17%	75.11%	24.69%	0.00%	0.00%	0.00%
Enclosure	8.73%	6.64%	0.00%	0.29%	9.07%	77.88%	19.40%	0.00%	0.00%	0.28%
Indentation	11.97%	14.08%	0.45%	0.28%	10.82%	77.24%	24.03%	1.03%	0.00%	0.00%
Sub-Numbering	6.41%	11.64%	0.00%	0.58%	15.74%	74.68%	31.23%	0.48%	0.28%	0.28%
Enclosure * Indentation	8.21%	7.76%	0.00%	0.31%	4.94%	68.34%	16.59%	0.00%	0.00%	0.00%
Enclosure * Sub-Numbering	10.35%	6.77%	0.99%	0.84%	9.71%	74.09%	24.69%	0.56%	0.00%	0.00%
Indentation * Sub-Numbering	6.99%	14.81%	0.00%	0.27%	19.24%	78.46%	33.45%	0.44%	0.00%	0.00%
Enclosure * Indentation * Sub-Numbering	8.12%	3.77%	1.93%	0.00%	4.64%	70.79%	15.32%	0.00%	0.00%	0.00%

Table N.5: Percent of respondents who had omission errors on the follow-up questions for each skip pattern in the UNL survey across all treatments

Visual Design Elements	**SP01**	**SP02**	**SP03**	**SP04**	**SP05**	**SP06**	**SP07**	**SP08**
Control Form: No Added Elements	1.54%	0.40%	6.42%	0.78%	0.00%	1.92%	0.00%	3.80%
Enclosure	1.52%	1.19%	4.51%	0.39%	0.00%	1.89%	0.75%	2.96%
Indentation	4.31%	0.41%	9.69%	1.21%	0.47%	3.47%	1.89%	6.11%
Enclosure * Indentation	2.66%	1.15%	5.95%	0.38%	0.00%	4.53%	0.75%	4.03%

Table N.6: Percent of respondents who had commission errors on the follow-up questions for each skip pattern in the UNL survey across all treatments

Visual Design Elements	**SP01**	**SP02**	**SP03**	**SP04**	**SP05**	**SP06**	**SP07**	**SP08**
Control Form: No Added Elements	3.04%	6.02%	0.40%	3.79%	0.96%	2.66%	0.00%	0.78%
Enclosure	1.15%	5.66%	1.17%	2.64%	3.88%	2.62%	0.75%	0.00%
Indentation	2.40%	7.31%	2.51%	6.51%	4.55%	1.96%	0.77%	1.60%
Enclosure * Indentation	1.92%	4.46%	1.17%	2.60%	2.94%	3.07%	1.85%	0.00%

Appendix O: Percent of Errors by Experimental Treatment for Respondents with Different Cognitive Ability Levels

O.1 Age

Table O.1: Percent of skip patterns where respondents with different age levels had item nonresponse errors on the filter question for the Labor survey across all treatments

Visual Design Element	<60	60+
Control From: No Added Elements	3.2%	5.0%
Enclosure	2.8%	7.0%
Indentation	3.0%	4.9%
Sub-numbering	4.3%	4.9%
Enclosure * Indentation	3.8%	4.3%
Enclosure * Sub-numbering	6.1%	4.1%
Indentation * Sub-numbering	4.8%	5.3%
Enclosure * Indentation * Sub-Numbering	4.0%	5.3%

Table O.2: Percent of skip patterns where respondents with different age levels had item nonresponse errors on the filter question for the UNL survey across all treatments

Visual Design Element	<60	60+
Control From: No Added Elements	0.9%	2.4%
Enclosure	0.7%	2.0%
Indentation	0.5%	2.1%
Enclosure * Indentation	0.3%	1.0%

Table O.3: Percent of skip patterns where respondents with different age levels had omission and commission errors on the follow-up questions for the Labor survey across all treatments

	Omission Errors		**Commission Errors**	
Visual Design Element	**<60**	**60+**	**<60**	**60+**
Control Form: No Added Elements	0.5%	0.7%	3.5%	8.3%
Enclosure	0.1%	0.3%	2.0%	5.2%
Indentation	0.4%	0.2%	2.9%	8.8%
Sub-numbering	0.9%	0.3%	2.2%	5.0%
Enclosure * Indentation	0.4%	0.2%	2.4%	4.2%
Enclosure * Sub-numbering	0.9%	0.3%	2.3%	5.5%
Indentation * Sub-numbering	0.7%	0.3%	2.9%	5.8%
Enclosure * Indentation * Sub-Numbering	0.3%	0.9%	1.2%	4.8%

Table O.4: Percent of skip patterns where respondents with different age levels had omission and commission errors on the follow-up questions for the UNL survey across all treatments

	Omission Errors		**Commission Errors**	
Visual Design Element	**<60**	**60+**	**<60**	**60+**
Control Form: No Added Elements	1.9%	1.9%	1.8%	2.8%
Enclosure	1.3%	2.3%	1.2%	3.6%
Indentation	2.9%	4.0%	2.8%	4.0%
Enclosure * Indentation	2.0%	3.1%	1.9%	2.7%

O.2 **Education**

Table O.5: Percent of skip patterns where respondents with low and high education had item nonresponse errors on the filter question for the Labor survey across all treatments

Visual Design Element	**Less than College Degree**	**At least Bachelor's Degree**
Control From: No Added Elements	4.7%	2.1%
Enclosure	5.5%	2.0%
Indentation	4.6%	2.0%
Sub-numbering	4.6%	4.4%
Enclosure * Indentation	4.3%	3.5%
Enclosure * Sub-numbering	5.9%	3.8%
Indentation * Sub-numbering	5.8%	3.5%
Enclosure * Indentation * Sub-Numbering	4.6%	4.1%

Table O.6: Percent of skip patterns where respondents with low and high education had item nonresponse errors on the filter question for the UNL survey across all treatments

Visual Design Element	**Less than College Degree**	**At least Bachelor's Degree**
Control From: No Added Elements	1.4%	1.4%
Enclosure	1.9%	0.5%
Indentation	1.1%	0.6%
Enclosure * Indentation	0.7%	0.5%

Table O.7: Percent of skip patterns where respondents with low and high education had omission errors on the follow-up questions for the Labor survey across all treatments

Visual Design Element	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	0.8%	0.2%
Enclosure	0.3%	0.0%
Indentation	0.5%	0.0%
Sub-numbering	0.6%	0.7%
Enclosure * Indentation	0.3%	0.4%
Enclosure * Sub-numbering	0.6%	0.6%
Indentation * Sub-numbering	0.5%	0.5%
Enclosure * Indentation * Sub-Numbering	0.5%	0.6%

Table O.8: Percent of skip patterns where respondents with low and high education had commission errors on the follow-up questions for the Labor survey across all treatments

Visual Design Element	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	6.5%	3.1%
Enclosure	3.7%	2.2%
Indentation	6.4%	3.0%
Sub-numbering	4.2%	2.0%
Enclosure * Indentation	3.6%	2.3%
Enclosure * Sub-numbering	4.6%	1.4%
Indentation * Sub-numbering	4.4%	3.3%
Enclosure * Indentation * Sub-Numbering	3.5%	0.8%

Table O.9: Percent of skip patterns where respondents with low and high education had omission errors on the follow-up questions for the UNL survey across all treatments

Visual Design Element	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	2.1%	1.5%
Enclosure	1.4%	2.0%
Indentation	3.8%	2.9%
Enclosure * Indentation	2.6%	2.3%

Table O.10: Percent of skip patterns where respondents with low and high education had commission errors on the follow-up questions for the UNL survey across all treatments

Visual Design Element	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	2.4%	2.0%
Enclosure	3.2%	1.0%
Indentation	4.0%	2.4%
Enclosure * Indentation	3.0%	1.2%

O.3 **Literacy**

Table O.11: Percent of skip patterns respondents with low and high literacy had item nonresponse errors on the filter question for the UNL survey across all treatments

Visual Design Element	Low-Literacy	High-Literacy
Control From: No Added Elements	0.9%	1.5%
Enclosure	4.6%	0.7%
Indentation	2.4%	0.7%
Enclosure * Indentation	1.0%	0.6%

Table O.12: Percent of skip patterns where respondents with low and high literacy had omission errors on the follow-up questions for the UNL survey across all treatments

Visual Design Element	**Low-Literacy**	**High-Literacy**
Control Form: No Added Elements	1.8%	1.9%
Enclosure	2.9%	1.5%
Indentation	4.3%	3.3%
Enclosure * Indentation	2.3%	2.5%

Table O.13: Percent of skip patterns where respondents with low and high literacy had commission errors on the follow-up questions for the UNL survey across all treatments

Visual Design Element	**Low-Literacy**	**High-Literacy**
Control Form: No Added Elements	3.9%	2.0%
Enclosure	4.8%	1.7%
Indentation	4.6%	3.0%
Enclosure * Indentation	3.0%	2.1%

Appendix P: Results for All Five Imputed Datasets for Chapter 3 Labor Survey Education

P.1 Response Rate Differences

Table P.1: Percent of respondents in each education group by experimental treatment for the imputed dataset 1

Experimental Treatment	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	67.6%	31.9%
Enclosure Only	65.6%	32.8%
Indentation Only	64.1%	34.6%
Sub-Numbering Only	65.1%	33.8%
Enclosure * Indentation	68.9%	30.8%
Enclosure * Sub-Numbering	71.4%	28.1%
Indentation * Sub-Numbering	67.2%	31.6%
Enclosure * Indentation * Sub-Numbering	65.2%	31.5%
Overall	**66.9**%	**31.9**%
	$\chi^2 = 5.33$, p = 0.62	

Table P.2: Percent of respondents in each education group by experimental treatment for the imputed dataset 2

Experimental Treatment	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	66.5%	31.6%
Enclosure Only	65.6%	32.5%
Indentation Only	64.4%	34.4%
Sub-Numbering Only	64.9%	33.8%
Enclosure * Indentation	68.1%	31.1%
Enclosure * Sub-Numbering	69.3%	29.7%
Indentation * Sub-Numbering	65.7%	32.3%
Enclosure * Indentation * Sub-Numbering	66.9%	31.2%
Overall	**66.4**%	**32.1**%
	$\chi^2 = 2.93$, p = 0.89	

Table P.3: Percent of respondents in each education group by experimental treatment for the imputed dataset 3

Experimental Treatment	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	68.1%	31.4%
Enclosure Only	66.7%	32.5%
Indentation Only	64.6%	33.8%
Sub-Numbering Only	66 %	33.2%
Enclosure * Indentation	69.2%	30.5%
Enclosure * Sub-Numbering	68.5%	29.9%
Indentation * Sub-Numbering	67.4%	31.6%
Enclosure * Indentation * Sub-Numbering	68.2%	30.1%
Overall	**67.3**%	**31.7**%
	$\chi^2 = 2.61$, p = 0.92	

Table P.4: Percent of respondents in each education group by experimental treatment for the imputed dataset 4

Experimental Treatment	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	66.5%	32.2%
Enclosure Only	66.4%	32.8%
Indentation Only	64.1%	34.6%
Sub-Numbering Only	64.3%	34.3%
Enclosure * Indentation	68.6%	30.5%
Enclosure * Sub-Numbering	70.9%	28.6%
Indentation * Sub-Numbering	67.7%	31.1%
Enclosure * Indentation * Sub-Numbering	68.2%	30.4%
Overall	**67.1**%	**31.8**%
	$\chi^2 = 5.52$, p = 0.60	

Table P.5: Percent of respondents in each education group by experimental treatment for the imputed dataset 5

Experimental Treatment	Less than College Degree	At least Bachelor's Degree
Control Form: No Added Elements	66.8%	31.6%
Enclosure Only	67.5%	32 %
Indentation Only	64.6%	34.4%
Sub-Numbering Only	64.9%	33.5%
Enclosure * Indentation	68.4%	31.1%
Enclosure * Sub-Numbering	69.8%	29.4%
Indentation * Sub-Numbering	66.2%	32.1%
Enclosure * Indentation * Sub-Numbering	66.6%	31.2%
Overall	**66.8**%	**31.9**%
	$\chi^2 = 3.01$, p = 0.88	

P.2 Overall Rates of Item Nonresponse to the Filter Question

Table P.6: Percent of skip patterns where respondents of different education levels had item nonresponse on the filter question for all imputed datasets

Imputed Dataset	Less than college degree	At least college degree	t-test	
1	4.9%	3.0%	t = -5.29	p <0.001
2	4.8%	3.1%	t = -4.63	p <0.001
3	5.1%	2.9%	t = -6.19	p <0.001
4	4.9%	3.1%	t = -5.15	p <0.001
5	5.0%	3.0%	t = -5.50	p <0.001

P.3 Overall Rates of Omission and Commission Errors on the Follow-up Questions

Table P.7: Percent of skip patterns where respondents of different education levels had omission errors on the follow-up questions for all imputed datasets

Imputed Dataset	Less than college degree	At least college degree	t-test	
1	0.4%	0.4%	t = -0.67	p = 0.50
2	0.4%	0.4%	t = -0.70	p = 0.48
3	0.4%	0.4%	t = -0.64	p = 0.53
4	0.4%	0.4%	t = -0.54	p = 0.59
5	0.4%	0.4%	t = -0.58	p = 0.56

Table P.8: Percent of skip patterns where respondents of different education levels had commission errors on the follow-up questions for all imputed datasets

Imputed Dataset	Less than college degree	At least college degree	t-test	
1	4.4%	2.2%	t = -6.67	p <0.001
2	4.4%	2.2%	t = -6.75	p <0.001
3	4.4%	2.2%	t = -6.88	p <0.001
4	4.4%	2.2%	t = -6.63	p <0.001
5	4.3%	2.2%	t = -6.53	p <0.001

P.4 **Item Nonresponse Multilevel Logistic Regression Models**

Table P.9: Odds ratios for the multilevel logistic regression predicting the probability respondents with different age and education levels have item nonresponse on the filter question for imputed dataset 1

Parameter	**Main Effects**	**2-way Interactions**		**3-way Interactions**	
		Age	Education	Age	Education
Intercept	0.004* (0.002, 0.008)	0.004* (0.002, 0.008)	0.003* (0.001, 0.007)	0.004* (0.002, 0.008)	0.003* (0.001, 0.008)
Enclosure	1.078 (0.809, 1.418)	1.259 (0.789, 2.008)	1.368 (0.742, 2.522)	1.262 (0.743, 2.142)	1.080 (0.497, 2.347)
Indentation	0.933 (0.713, 1.248)	1.084 (0.679, 1.729)	1.282 (0.700, 2.350)	1.084 (0.638, 1.842)	1.025 (0.482, 2.180)
Sub-Numbering	1.280 (0.980, 1.718)	1.592* (1.097, 2.310)	1.810* (1.052, 3.113)	1.592* (1.097, 2.310)	1.796* (1.045, 3.085)
Enclosure * Indentation		0.805 (0.461, 1.405)	0.791 (0.453, 1.383)	0.803 (0.382, 1.688)	1.241 (0.425, 3.619)
Age: 60 years old or Older	1.127 (0.888, 1.566)	1.648 (0.930, 2.921)	1.121 (0.846, 1.487)	1.650 (0.873, 3.121)	1.125 (0.848, 1.490)
Education: Less than College Degree	1.776* (1.286, 2.410)	1.754* (1.281, 2.402)	2.872* (1.475, 5.594)	1.754* (1.281, 2.402)	2.433* (1.166, 5.080)
Enclosure * Age		0.885 (0.505,1.552)		0.881 (0.403,1.928)	
Indentation * Age		0.902 (0.514,1.580)		0.901 (0.410,1.980)	
Sub-Numbering * Age		0.602 (0.344,1.055)		0.603 (0.344,1.056)	
Enclosure * Indentation * Age				1.006 (0.327,3.090)	
Enclosure * Education			0.845 (0.451,1.584)		1.159 (0.472,2.847)
Indentation * Education			0.759 (0.405,1.423)		1.031 (0.426,2.493)
Sub-Numbering * Education			0.622 (0.330,1.170)		0.624 (0.332,1.174)
Enclosure * Indentation * Education					0.540 (0.154,1.891)
Respondent Variance	5.5490	5.3042	5.3371	5.3035	5.2786
ICC	0.6278	0.6172	0.6187	0.6172	0.6160
-2*Log-Likelihood	4180.68	4176.71	4176.99	4176.71	4176.07
AIC	4194.68	4198.71	4198.99	4200.71	4200.07

Table P.10: Odds ratios for the multilevel logistic regression predicting the probability respondents with different age and education levels have item nonresponse on the filter question for imputed dataset 2

Parameter	**Main Effects**	**2-way Interactions**		**3-way Interactions**	
		Age	Education	Age	Education
Intercept	0.004* (0.002, 0.008)	0.004* (0.002, 0.008)	0.003* (0.001, 0.007)	0.004* (0.002, 0.008)	0.004* (0.002, 0.009)
Enclosure	1.085 (0.809, 1.418)	1.225 (0.764, 1.965)	1.26 (0.685, 2.315)	1.216 (0.712, 2.076)	0.898 (0.419, 1.927)
Indentation	0.984 (0.713, 1.248)	1.111 (0.694, 1.778)	1.19 (0.651, 2.175)	1.1 (0.646, 1.874)	0.862 (0.41, 1.812)
Sub-Numbering	1.309 (0.980, 1.718)	1.563* (1.073, 2.276)	1.795* (1.044, 3.085)	1.563* (1.073, 2.277)	1.783* (1.041, 3.054)
Enclosure * Indentation		0.798 (0.454, 1.403)	0.789 (0.449, 1.388)	0.811 (0.383, 1.719)	1.525 (0.526, 4.419)
Age: 60 years old or Older	1.145 (0.888, 1.566)	1.467 (0.818, 2.63)	1.14 (0.857, 1.517)	1.451 (0.755, 2.789)	1.146 (0.863, 1.522)
Education: Less than College Degree	1.689* (1.286, 2.410)	1.674* (1.221, 2.295)	2.301* (1.182, 4.477)	1.675* (1.222, 2.296)	1.812* (0.877, 3.745)
Enclosure * Age		0.973 (0.551,1.716)		0.991 (0.445,2.205)	
Indentation * Age		0.973 (0.552,1.718)		0.995 (0.447,2.216)	
Sub-Numbering * Age		0.663 (0.375,1.169)		0.662 (0.375,1.169)	
Enclosure * Indentation * Age				0.962 (0.309,2.994)	
Enclosure * Education			0.96 (0.511,1.802)		1.525 (0.624,3.725)
Indentation * Education			0.907 (0.483,1.704)		1.423 (0.591,3.424)
Sub-Numbering * Education			0.645 (0.342,1.218)		0.648 (0.345,1.218)
Enclosure * Indentation * Education					0.402 (0.115,1.405)
Respondent Variance	5.6933	5.5163	5.5462	5.5127	5.2786
ICC	0.6338	0.6264	0.6277	0.6263	0.616
-2*Log-Likelihood	4140.06	4137.4	4137.5	4137.39	4135.48
AIC	4154.06	4159.4	4159.5	4161.39	4159.48

Table P.11: Odds ratios for the multilevel logistic regression predicting the probability respondents with different age and education levels have item nonresponse on the filter question for imputed dataset 3

Parameter	**Main Effects**	**2-way Interactions**		**3-way Interactions**	
		Age	Education	Age	Education
Intercept	0.004* (0.002, 0.008)	0.004* (0.002, 0.007)	0.003* (0.001, 0.006)	0.004* (0.002, 0.008)	0.003* (0.001, 0.007)
Enclosure	1.095 (0.809, 1.418)	1.187 (0.751, 1.876)	1.375 (0.745, 2.537)	1.182 (0.704, 1.987)	1.138 (0.517, 2.505)
Indentation	0.926 (0.713, 1.248)	1.042 (0.659, 1.646)	1.382 (0.753, 2.538)	1.038 (0.618, 1.743)	1.163 (0.54, 2.504)
Sub-Numbering	1.285 (0.980, 1.718)	1.617* (1.121, 2.332)	2.006* (1.159, 3.473)	1.618* (1.122, 2.333)	2.002* (1.157, 3.465)
Enclosure * Indentation		0.858 (0.497, 1.482)	0.842 (0.488, 1.452)	0.865 (0.417, 1.794)	1.200 (0.408, 3.530)
Age: 60 years old or Older	1.145 (0.888, 1.566)	1.608 (0.918, 2.816)	1.14 (0.865, 1.502)	1.601 (0.857, 2.991)	1.142 (0.867, 1.505)
Education:					
Less than College Degree	1.967* (1.286, 2.410)	1.949* (1.424, 2.665)	3.721* (1.891, 7.323)	1.949* (1.424, 2.666)	3.274* (1.543, 6.943)
Enclosure * Age		0.978 (0.564,1.695)		0.986 (0.457,2.128)	
Indentation * Age		0.907 (0.523,1.572)		0.915 (0.422,1.986)	
Sub-Numbering * Age		0.59 (0.34,1.023)		0.59 (0.34,1.023)	
Enclosure * Indentation * Age				0.983 (0.327,2.954)	
Enclosure * Education			0.828 (0.443,1.547)		1.065 (0.432,2.626)
Indentation * Education			0.659 (0.352,1.232)		0.835 (0.344,2.026)
Sub-Numbering * Education			0.551 (0.293,1.038)		0.551 (0.293,1.038)
Enclosure * Indentation * Education					0.616 (0.177,2.149)
Respondent Variance	5.1626	4.9662	4.8847	4.9669	4.8803
ICC	0.6108	0.6015	0.5975	0.6016	0.5973
-2*Log-Likelihood	4217.18	4213.22	4211.57	4213.22	4210.87
AIC	4231.18	4235.22	4233.57	4237.22	4234.87

Table P.12: Odds ratios for the multilevel logistic regression predicting the probability respondents with different age and education levels have item nonresponse on the filter question for imputed dataset 4

Parameter	**Main Effects**	**2-way Interactions**		**3-way Interactions**	
		Age	Education	Age	Education
Intercept	0.005* (0.002, 0.008)	0.004* (0.002, 0.008)	0.003* (0.002, 0.007)	0.004* (0.002, 0.008)	0.004* (0.002, 0.009)
Enclosure	1.085 (0.809, 1.418)	1.216 (0.769, 1.922)	1.412 (0.773, 2.58)	1.226 (0.729, 2.059)	1.056 (0.494, 2.26)
Indentation	0.933 (0.713, 1.248)	1.06 (0.67, 1.676)	1.274 (0.699, 2.319)	1.067 (0.635, 1.794)	0.961 (0.455, 2.031)
Sub-Numbering	1.327 (0.980, 1.718)	1.659* (1.15, 2.392)	1.661* (0.974, 2.833)	1.658* (1.15, 2.391)	1.65 * (0.969, 2.809)
Enclosure * Indentation		0.826 (0.477, 1.428)	0.814 (0.469, 1.413)	0.814 (0.392, 1.687)	1.423 (0.495, 4.093)
Age: 60 years old or Older	1.114 (0.888, 1.566)	1.566 (0.889, 2.756)	1.112 (0.841, 1.47)	1.582 (0.841, 2.974)	1.116 (0.845, 1.473)
Education: Less than College Degree	1.759* (1.286, 2.410)	1.741* (1.277, 2.373)	2.675* (1.39, 5.148)	1.74 * (1.276, 2.37)	2.18 * (1.061, 4.48)
Enclosure * Age		0.948 (0.546,1.647)		0.931 (0.43,2.016)	
Indentation * Age		0.929 (0.534,1.613)		0.913 (0.419,1.99)	
Sub-Numbering * Age		0.596 (0.343,1.036)		0.597 (0.343,1.037)	
Enclosure * Indentation * Age				1.034 (0.343,3.119)	
Enclosure * Education			0.801 (0.431,1.489)		1.183 (0.489,2.86)
Indentation * Education			0.752 (0.404,1.4)		1.104 (0.461,2.647)
Sub-Numbering * Education			0.736 (0.395,1.373)		0.739 (0.397,1.376)
Enclosure * Indentation * Education					0.466 (0.135,1.604)
Respondent Variance	5.1723	4.9773	5.0848	4.9692	5.0016
ICC	0.6112	0.6021	0.6072	0.6017	0.6032
-2*Log-Likelihood	4181.58	4177.65	4178.93	4177.64	4177.47
AIC	4195.58	4199.65	4200.93	4201.64	4201.47

Table P.13: Odds ratios for the multilevel logistic regression predicting the probability respondents with different age and education levels have item nonresponse on the filter question for imputed dataset 5

Parameter	**Main Effects**	**2-way Interactions**		**3-way Interactions**	
		Age	Education	Age	Education
Intercept	0.004* (0.002, 0.008)	0.004* (0.002, 0.007)	0.003* (0.001, 0.006)	0.004* (0.002, 0.008)	0.004* (0.002, 0.008)
Enclosure	1.108 (0.809, 1.418)	1.262 (0.794, 2.007)	1.349 (0.734, 2.48)	1.236 (0.731, 2.09)	0.939 (0.433, 2.037)
Indentation	0.958 (0.713, 1.248)	1.11 (0.698, 1.765)	1.35 (0.739, 2.463)	1.086 (0.642, 1.837)	0.962 (0.457, 2.028)
Sub-Numbering	1.314 (0.980, 1.718)	1.62 * (1.119, 2.346)	1.99 * (1.157, 3.424)	1.621* (1.12, 2.347)	1.979* (1.153, 3.398)
Enclosure * Indentation		0.771 (0.443, 1.341)	0.76 (0.437, 1.321)	0.804 (0.384, 1.683)	1.505 (0.52, 4.356)
Age: 60 years old or Older	1.152 (0.888, 1.566)	1.531 (0.863, 2.714)	1.146 (0.867, 1.516)	1.493 (0.785, 2.837)	1.152 (0.872, 1.522)
Education:					
Less than College Degree	1.81 * (1.286, 2.410)	1.791* (1.31, 2.448)	2.969* (1.518, 5.805)	1.792* (1.311, 2.449)	2.313* (1.112, 4.81)
Enclosure * Age		0.986 (0.565,1.722)		1.034 (0.473,2.26)	
Indentation * Age		0.959 (0.549,1.674)		1.007 (0.458,2.212)	
Sub-Numbering * Age		0.618 (0.354,1.078)		0.617 (0.354,1.078)	
Enclosure * Indentation * Age				0.909 (0.298,2.769)	
Enclosure * Education			0.921 (0.494,1.719)		1.493 (0.61,3.652)
Indentation * Education			0.758 (0.406,1.416)		1.205 (0.503,2.887)
Sub-Numbering * Education			0.568 (0.302,1.067)		0.569 (0.304,1.067)
Enclosure * Indentation * Education					0.394 (0.114,1.365)
Respondent Variance	5.4244	5.2138	5.181	5.2153	5.0661
ICC	0.6225	0.6131	0.6116	0.6132	0.6063
-2*Log-Likelihood	4218.16	4214.4	4213.42	4214.37	4211.27
AIC	4232.16	4236.4	4235.42	4238.37	4235.27

P.5 **Omission and Commission Error Multilevel Multinomial Regression Models**

Table P.14: Odds ratios for the main effects of the multilevel multinomial regression predicting the probability respondents with different age and education levels have omission and commission errors on the follow-up questions for imputed dataset 1

Parameter	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.008)	0.021* (0.016,0.028)
Enclosure	0.734 (0.418,1.290)	0.687* (0.564,0.836)
Indentation	0.897 (0.514,1.565)	0.938 (0.773,1.138)
Sub-Numbering	1.806* (1.012,3.223)	0.768* (0.632,0.933)
Age: 60 years old or Older	0.558 (0.296,1.053)	2.334* (1.917,2.842)
Education:		
Less than College Degree	1.272 (0.692,2.336)	1.926* (1.517,2.446)
Respondent Variance	0.0000	0.0000
ICC	0.0000	0.0000
-2*Log Pseudo-Likelihood	154124.60	

Table P.15: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different age levels have omission and commission errors on the follow-up questions for imputed dataset 1

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.009)	0.021* (0.015,0.030)	0.004* (0.002,0.009)	0.021* (0.015,0.030)
Enclosure	0.588 (0.383,4.109)	0.751 (0.524,1.076)	0.625 (0.255,1.534)	0.730 (0.479,1.115)
Indentation	0.780 (0.358,1.700)	1.026 (0.730,1.441)	0.820 (0.361,1.865)	1.002 (0.680,1.476)
Sub-Numbering	1.950 (0.990,3.839)	0.756 (0.558,1.025)	1.948 (0.989,3.836)	0.756 (0.558,1.025)
Enclosure * Indentation	1.068 (0.341,3.347)	0.745 (0.501,1.107)	0.934 (0.244,3.572)	0.790 (0.426,1.466)
Age: 60 years old or Older	0.388 (0.095,1.582)	2.176* (1.502,3.152)	0.438 (0.097,1.986)	2.132* (1.422,3.196)
Education: Less than College Degree	1.265 (0.688,2.326)	1.928* (1.518,2.448)	1.265 (0.688,2.325)	1.927* (1.518,2.448)
Enclosure * Age	2.033 (0.563,7.339)	1.090 (0.729,1.628)	1.576 (0.251,9.898)	1.142 (0.659,1.979)
Indentation * Age	1.528 (0.423,5.520)	1.053 (0.710,1.562)	1.196 (0.198,7.246)	1.096 (0.659,1.822)
Sub-Numbering * Age	0.770 (0.208,2.852)	1.023 (0.689,1.520)	0.774 (0.209,2.867)	1.022 (0.688,1.518)
Enclosure * Indentation * Age			1.642 (0.125,21.529)	0.905 (0.404,2.024)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154468.50		154512.10	

Table P.16: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different education levels have omission and commission errors on the follow-up questions for imputed dataset 1

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.001* (0.000,0.006)	0.021* (0.014,0.031)	0.002* (0.000,0.008)	0.020* (0.013,0.032)
Enclosure	1.255 (0.383,4.109)	0.734 (0.452,1.190)	0.829 (0.185,3.723)	0.782 (0.421,1.452)
Indentation	1.034 (0.316,3.388)	1.189 (0.757,1.865)	0.684 (0.152,3.068)	1.246 (0.727,2.133)
Sub-Numbering	4.411* (1.241,15.680)	0.677 (0.440,1.042)	4.340* (1.220,15.433)	0.678 (0.440,1.043)
Enclosure * Indentation	1.024 (0.326,3.219)	0.750 (0.505,1.115)	2.246 (0.281,17.950)	0.660 (0.272,1.602)
Age: 60 years old or Older	0.549 (0.291,1.036)	2.341* (1.922,2.851)	0.551 (0.292,1.039)	2.342* (1.923,2.851)
Education:				
Less than College Degree	4.665 (0.291,1.036)	1.883* (1.199,2.958)	3.556 (0.734,17.239)	1.947* (1.181,3.210)
Enclosure * Education	0.456 (0.133,1.563)	1.090 (0.665,1.788)	0.808 (0.139,4.687)	1.009 (0.507,2.009)
Indentation * Education	0.795 (0.232,2.723)	0.858 (0.531,1.386)	1.370 (0.245,7.648)	0.808 (0.440,1.485)
Sub-Numbering * Education	0.297 (0.071,1.250)	1.167 (0.720,1.892)	0.300 (0.071,1.262)	1.167 (0.720,1.892)
Enclosure * Indentation * Education			0.318 (0.026,3.899)	1.174 (0.435,3.165)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154636.10		154611.40	

Table P.17: Odds ratios for the main effects of the multilevel multinomial regression predicting the probability respondents with different age and education levels have omission and commission errors on the follow-up questions for imputed dataset 2

Parameter	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.008)	0.020* (0.015,0.027)
Enclosure	0.735 (0.418,1.291)	0.699* (0.574,0.852)
Indentation	0.898 (0.515,1.568)	0.971 (0.800,1.179)
Sub-Numbering	1.805* (1.011,3.221)	0.799* (0.658,0.971)
Age: 60 years old or Older	0.566 (0.300,1.068)	2.287* (1.878,2.785)
Education:		
Less than College Degree	1.282 (0.698,2.355)	1.959* (1.541,2.491)
Respondent Variance	0.0000	0.0000
ICC	0.0000	0.0000
-2*Log Pseudo-Likelihood	153737.70	

Table P.18: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different age levels have omission and commission errors on the follow-up questions for imputed dataset 2

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.009)	0.021* (0.015,0.029)	0.004* (0.002,0.009)	0.021* (0.015,0.030)
Enclosure	0.597 (0.380,4.080)	0.755 (0.527,1.081)	0.633 (0.258,1.552)	0.736 (0.482,1.124)
Indentation	0.787 (0.361,1.715)	1.047 (0.747,1.469)	0.826 (0.363,1.878)	1.026 (0.698,1.510)
Sub-Numbering	1.943 (0.987,3.825)	0.758 (0.560,1.025)	1.942 (0.986,3.823)	0.758 (0.560,1.026)
Enclosure * Indentation	1.057 (0.337,3.311)	0.762 (0.513,1.132)	0.928 (0.243,3.550)	0.802 (0.434,1.481)
Age: 60 years old or Older	0.399 (0.098,1.627)	2.045* (1.407,2.973)	0.450 (0.099,2.042)	2.008* (1.332,3.026)
Education: Less than College Degree	1.273 (0.693,2.340)	1.965* (1.546,2.498)	1.272 (0.692,2.338)	1.965* (1.546,2.498)
Enclosure * Age	1.972 (0.546,7.116)	1.102 (0.738,1.647)	1.542 (0.246,9.683)	1.149 (0.660,2.002)
Indentation * Age	1.510 (0.418,5.456)	1.066 (0.719,1.582)	1.193 (0.197,7.225)	1.105 (0.663,1.843)
Sub-Numbering * Age	0.774 (0.209,2.867)	1.094 (0.736,1.626)	0.777 (0.210,2.877)	1.094 (0.736,1.625)
Enclosure * Indentation * Age			1.614 (0.123,21.151)	0.916 (0.410,2.046)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154074.10		154117.20	

Table P.19: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different education levels have omission and commission errors on the follow-up questions for imputed dataset 2

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.001* (0.000,0.006)	0.021* (0.014,0.032)	0.002* (0.000,0.008)	0.020* (0.013,0.032)
Enclosure	1.245 (0.380,4.080)	0.696 (0.427,1.134)	0.796 (0.177,3.573)	0.716 (0.381,1.342)
Indentation	1.045 (0.319,3.424)	1.197 (0.761,1.882)	0.668 (0.149,2.998)	1.221 (0.713,2.090)
Sub-Numbering	4.331* (1.219,15.394)	0.678 (0.440,1.045)	4.277* (1.203,15.203)	0.678 (0.440,1.045)
Enclosure * Indentation	1.027 (0.327,3.223)	0.768 (0.517,1.142)	2.396 (0.300,19.131)	0.726 (0.297,1.776)
Age: 60 years old or Older	0.558 (0.296,1.053)	2.297* (1.886,2.797)	0.560 (0.297,1.057)	2.297* (1.886,2.797)
Education:				
Less than College Degree	4.620 (0.296,1.053)	1.796* (1.137,2.834)	3.449 (0.711,16.725)	1.821* (1.101,3.010)
Enclosure * Education	0.462 (0.135,1.582)	1.180 (0.717,1.942)	0.857 (0.148,4.967)	1.141 (0.567,2.295)
Indentation * Education	0.790 (0.231,2.707)	0.880 (0.543,1.425)	1.423 (0.255,7.945)	0.858 (0.466,1.578)
Sub-Numbering * Education	0.305 (0.073,1.282)	1.228 (0.756,1.994)	0.308 (0.073,1.292)	1.228 (0.756,1.995)
Enclosure * Indentation * Education			0.291 (0.024,3.558)	1.071 (0.395,2.905)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154259.30		154237.60	

Table P.20: Odds ratios for the main effects of the multilevel multinomial regression predicting the probability respondents with different age and education levels have omission and commission errors on the follow-up questions for imputed dataset 3

Parameter	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.008)	0.021* (0.016,0.027)
Enclosure	0.738 (0.420,1.296)	0.696* (0.572,0.847)
Indentation	0.893 (0.512,1.558)	0.950 (0.783,1.152)
Sub-Numbering	1.801* (1.009,3.215)	0.777* (0.640,0.943)
Age: 60 years old or Older	0.564 (0.299,1.063)	2.346* (1.928,2.855)
Education:		
Less than College Degree	1.255 (0.684,2.305)	1.982* (1.558,2.521)
Respondent Variance	0.0000	0.0000
ICC	0.0000	0.0000
-2*Log Pseudo-Likelihood	154337.10	

Table P.21: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different age levels have omission and commission errors on the follow-up questions for imputed dataset 3

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.010)	0.020* (0.014,0.029)	0.004* (0.002,0.009)	0.021* (0.014,0.029)
Enclosure	0.597 (0.380,4.078)	0.754 (0.527,1.079)	0.635 (0.259,1.558)	0.739 (0.484,1.128)
Indentation	0.785 (0.360,1.711)	1.025 (0.730,1.439)	0.826 (0.363,1.879)	1.008 (0.684,1.484)
Sub-Numbering	1.939 (0.985,3.817)	0.761 (0.562,1.030)	1.938 (0.984,3.816)	0.761 (0.562,1.031)
Enclosure * Indentation	1.050 (0.335,3.291)	0.771 (0.519,1.143)	0.916 (0.239,3.504)	0.804 (0.435,1.486)
Age: 60 years old or Older	0.393 (0.096,1.599)	2.183* (1.508,3.160)	0.445 (0.098,2.015)	2.151* (1.434,3.225)
Education: Less than College Degree	1.246 (0.678,2.289)	1.986* (1.561,2.527)	1.245 (0.677,2.288)	1.986* (1.561,2.526)
Enclosure * Age	2.023 (0.561,7.303)	1.081 (0.725,1.613)	1.562 (0.249,9.807)	1.119 (0.645,1.942)
Indentation * Age	1.509 (0.418,5.454)	1.053 (0.711,1.560)	1.177 (0.194,7.131)	1.084 (0.652,1.802)
Sub-Numbering * Age	0.776 (0.210,2.874)	1.034 (0.696,1.534)	0.779 (0.210,2.887)	1.033 (0.696,1.533)
Enclosure * Indentation * Age			1.656 (0.126,21.704)	0.930 (0.418,2.073)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154662.90		154710.10	

Table P.22: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different education levels have omission and commission errors on the follow-up questions for imputed dataset 3

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.001* (0.000,0.006)	0.021* (0.013,0.031)	0.002* (0.000,0.008)	0.019* (0.012,0.030)
Enclosure	1.244 (0.380,4.078)	0.705 (0.433,1.146)	0.787 (0.175,3.534)	0.835 (0.451,1.546)
Indentation	1.064 (0.325,3.491)	1.139 (0.723,1.793)	0.674 (0.150,3.024)	1.297 (0.753,2.236)
Sub-Numbering	4.392* (1.236,15.608)	0.697 (0.451,1.077)	4.337* (1.220,15.416)	0.697 (0.451,1.077)
Enclosure * Indentation	1.021 (0.325,3.205)	0.774 (0.521,1.148)	2.428 (0.304,19.393)	0.538 (0.217,1.337)
Age: 60 years old or Older	0.555 (0.294,1.047)	2.352* (1.933,2.863)	0.557 (0.295,1.051)	2.353* (1.933,2.864)
Education:				
Less than College Degree	4.642 (0.294,1.047)	1.865* (1.184,2.939)	3.443 (0.712,16.660)	2.044* (1.230,3.397)
Enclosure * Education	0.466 (0.136,1.596)	1.148 (0.697,1.891)	0.876 (0.151,5.081)	0.930 (0.469,1.847)
Indentation * Education	0.766 (0.224,2.627)	0.906 (0.559,1.469)	1.399 (0.251,7.810)	0.768 (0.416,1.419)
Sub-Numbering * Education	0.298 (0.071,1.251)	1.142 (0.703,1.857)	0.300 (0.071,1.260)	1.144 (0.703,1.859)
Enclosure * Indentation * Education			0.283 (0.023,3.461)	1.565 (0.570,4.298)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154841.10		154858.50	

Table P.23: Odds ratios for the main effects of the multilevel multinomial regression predicting the probability respondents with different age and education levels have omission and commission errors on the follow-up questions for imputed dataset 4

Parameter	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.008)	0.021* (0.016,0.028)
Enclosure	0.758 (0.430,1.338)	0.696* (0.572,0.846)
Indentation	0.928 (0.529,1.629)	0.943 (0.777,1.144)
Sub-Numbering	1.907* (1.057,3.441)	0.777* (0.640,0.943)
Age: 60 years old or Older	0.579 (0.306,1.096)	2.322* (1.908,2.825)
Education:		
Less than College Degree	1.221 (0.663,2.248)	1.930* (1.521,2.451)
Respondent Variance	0.0000	0.0000
ICC	0.0000	0.0000
-2*Log Pseudo-Likelihood	154625.60	

Table P.24: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different age levels have omission and commission errors on the follow-up questions for imputed dataset 4

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.009)	0.021* (0.015,0.030)	0.004* (0.002,0.009)	0.021* (0.015,0.030)
Enclosure	0.633 (0.398,4.290)	0.739 (0.516,1.058)	0.683 (0.274,1.703)	0.729 (0.477,1.112)
Indentation	0.839 (0.379,1.854)	1.025 (0.731,1.437)	0.893 (0.386,2.066)	1.013 (0.689,1.489)
Sub-Numbering	2.108* (1.052,4.226)	0.758 (0.560,1.026)	2.107* (1.051,4.224)	0.758 (0.560,1.026)
Enclosure * Indentation	1.004 (0.318,3.166)	0.783 (0.528,1.161)	0.853 (0.221,3.300)	0.807 (0.437,1.490)
Age: 60 years old or Older	0.447 (0.108,1.850)	2.161* (1.492,3.129)	0.519 (0.113,2.390)	2.138* (1.425,3.208)
Education: Less than College Degree	1.210 (0.657,2.231)	1.932* (1.522,2.453)	1.210 (0.656,2.230)	1.932* (1.522,2.453)
Enclosure * Age	1.918 (0.530,6.943)	1.102 (0.739,1.644)	1.413 (0.223,8.941)	1.129 (0.651,1.959)
Indentation * Age	1.449 (0.400,5.254)	1.030 (0.695,1.526)	1.081 (0.177,6.598)	1.051 (0.632,1.749)
Sub-Numbering * Age	0.705 (0.189,2.635)	1.040 (0.701,1.543)	0.708 (0.189,2.648)	1.040 (0.701,1.543)
Enclosure * Indentation * Age			1.809 (0.137,23.841)	0.950 (0.427,2.116)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154955.80		155011.50	

Table P.25: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different education levels have omission and commission errors on the follow-up questions for imputed dataset 4

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.001* (0.000,0.006)	0.021* (0.014,0.031)	0.002* (0.000,0.007)	0.019* (0.012,0.031)
Enclosure	1.307 (0.398,4.290)	0.722 (0.446,1.168)	0.830 (0.185,3.727)	0.833 (0.453,1.533)
Indentation	1.096 (0.334,3.601)	1.142 (0.728,1.790)	0.697 (0.155,3.127)	1.274 (0.744,2.181)
Sub-Numbering	4.415* (1.242,15.691)	0.710 (0.462,1.092)	4.341* (1.221,15.434)	0.712 (0.463,1.094)
Enclosure * Indentation	0.973 (0.308,3.073)	0.787 (0.530,1.168)	2.297 (0.287,18.348)	0.583 (0.239,1.423)
Age: 60 years old or Older	0.572 (0.302,1.082)	2.327* (1.912,2.832)	0.573 (0.303,1.084)	2.328* (1.913,2.833)
Education:				
Less than College Degree	4.303 (0.302,1.082)	1.881* (1.198,2.952)	3.170 (0.643,15.632)	2.032* (1.229,3.359)
Enclosure * Education	0.465 (0.135,1.599)	1.101 (0.672,1.804)	0.876 (0.150,5.133)	0.922 (0.467,1.822)
Indentation * Education	0.795 (0.231,2.733)	0.888 (0.550,1.433)	1.453 (0.258,8.195)	0.772 (0.420,1.419)
Sub-Numbering * Education	0.317 (0.075,1.341)	1.117 (0.690,1.807)	0.321 (0.076,1.356)	1.115 (0.689,1.806)
Enclosure * Indentation * Education			0.284 (0.023,3.501)	1.454 (0.537,3.933)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	155074.60		155064.60	

Table P.26: Odds ratios for the main effects of the multilevel multinomial regression predicting the probability respondents with different age and education levels have omission and commission errors on the follow-up questions for imputed dataset 5

Parameter	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.008)	0.021* (0.016,0.028)
Enclosure	0.759 (0.430,1.340)	0.702* (0.576,0.855)
Indentation	0.933 (0.532,1.637)	0.957 (0.788,1.162)
Sub-Numbering	1.914* (1.061,3.452)	0.767* (0.631,0.932)
Age: 60 years old or Older	0.580 (0.307,1.097)	2.312* (1.897,2.816)
Education:		
Less than College Degree	1.237 (0.672,2.278)	1.902* (1.498,2.415)
Respondent Variance	0.0000	0.0000
ICC	0.0000	0.0000
-2*Log Pseudo-Likelihood	154492.60	

Table P.27: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different age levels have omission and commission errors on the follow-up questions for imputed dataset 5

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.004* (0.002,0.009)	0.021* (0.015,0.029)	0.004* (0.002,0.009)	0.021* (0.015,0.030)
Enclosure	0.634 (0.389,4.193)	0.778 (0.543,1.116)	0.684 (0.274,1.705)	0.745 (0.487,1.139)
Indentation	0.844 (0.382,1.867)	1.062 (0.755,1.493)	0.898 (0.388,2.079)	1.023 (0.693,1.510)
Sub-Numbering	2.110* (1.053,4.228)	0.758 (0.559,1.028)	2.109* (1.052,4.226)	0.759 (0.560,1.028)
Enclosure * Indentation	1.000 (0.317,3.153)	0.733 (0.492,1.090)	0.850 (0.220,3.288)	0.803 (0.434,1.487)
Age: 60 years old or Older	0.443 (0.107,1.836)	2.176* (1.496,3.165)	0.514 (0.112,2.371)	2.105* (1.396,3.175)
Education: Less than College Degree	1.228 (0.666,2.262)	1.903* (1.498,2.418)	1.226 (0.665,2.260)	1.903* (1.498,2.417)
Enclosure * Age	1.931 (0.533,6.989)	1.082 (0.724,1.619)	1.423 (0.225,9.005)	1.166 (0.670,2.030)
Indentation * Age	1.449 (0.400,5.252)	1.043 (0.702,1.549)	1.081 (0.177,6.600)	1.111 (0.665,1.857)
Sub-Numbering * Age	0.714 (0.191,2.668)	1.016 (0.683,1.511)	0.717 (0.192,2.681)	1.015 (0.682,1.510)
Enclosure * Indentation * Age			1.807 (0.137,23.815)	0.855 (0.382,1.913)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154840.10		154886.50	

Table P.28: Odds ratios for the multilevel multinomial regression predicting the probability respondents with different education levels have omission and commission errors on the follow-up questions for imputed dataset 5

Parameter	**2-way Interactions**		**3-way Interaction**	
	Omission Errors	Commission Errors	Omission Errors	Commission Errors
Intercept	0.001* (0.000,0.006)	0.021* (0.014,0.033)	0.002* (0.000,0.008)	0.021* (0.013,0.033)
Enclosure	1.277 (0.389,4.193)	0.698 (0.430,1.132)	0.802 (0.179,3.598)	0.739 (0.400,1.366)
Indentation	1.066 (0.324,3.501)	1.130 (0.721,1.771)	0.670 (0.149,3.004)	1.180 (0.693,2.008)
Sub-Numbering	4.332* (1.219,15.394)	0.701 (0.456,1.077)	4.273* (1.202,15.188)	0.701 (0.456,1.077)
Enclosure * Indentation	0.973 (0.308,3.073)	0.735 (0.494,1.095)	2.349 (0.294,18.758)	0.650 (0.266,1.592)
Age: 60 years old or Older	0.572 (0.302,1.082)	2.315* (1.900,2.821)	0.574 (0.303,1.086)	2.315* (1.900,2.822)
Education:				
Less than College Degree	4.117 (0.302,1.082)	1.730* (1.102,2.718)	3.014 (0.612,14.832)	1.784* (1.085,2.932)
Enclosure * Education	0.481 (0.140,1.653)	1.212 (0.737,1.993)	0.921 (0.157,5.396)	1.127 (0.568,2.237)
Indentation * Education	0.834 (0.242,2.867)	0.949 (0.587,1.535)	1.549 (0.275,8.732)	0.898 (0.490,1.645)
Sub-Numbering * Education	0.327 (0.077,1.382)	1.117 (0.689,1.809)	0.330 (0.078,1.393)	1.117 (0.689,1.809)
Enclosure * Indentation * Education			0.275 (0.022,3.387)	1.165 (0.429,3.164)
Respondent Variance	0.0000	0.0000	0.0000	0.0000
ICC	0.0000	0.0000	0.0000	0.0000
-2*Log Pseudo-Likelihood	154967.50		154945.00	

Appendix Q: Percent of Errors by Experimental Treatment for Respondents with Different Motivation Levels

Q.1 Number of Contacts: Early and Late Responders

Table Q.1: Percent of skip patterns where early and late responders had item nonresponse errors on the filter question for the Labor survey across all treatments

Visual Design Element	Late	Early
Control Form: No Added Elements	5.0%	3.9%
Enclosure	5.1%	4.4%
Indentation	5.3%	3.5%
Sub-numbering	6.5%	4.4%
Enclosure * Indentation	4.1%	3.9%
Enclosure * Sub-numbering	7.2%	5.0%
Indentation * Sub-numbering	5.4%	5.5%
Enclosure * Indentation * Sub-Numbering	5.4%	5.4%

Table Q.2: Percent of skip patterns where early and late responders had item nonresponse errors on the filter question for the UNL survey across all treatments

Visual Design Element	Late	Early
Control Form: No Added Elements	1.9%	1.1%
Enclosure	1.5%	0.8%
Indentation	1.6%	0.8%
Enclosure * Indentation	0.5%	0.8%

Table Q.3: Percent of skip patterns where early and late responders had omission and commission errors on the follow-up questions for the Labor survey across all treatments

	Omission Errors		**Commission Errors**	
Visual Design Element	**Late**	**Early**	**Late**	**Early**
Control Form: No Added Elements	0.5%	0.6%	13.3%	11.7%
Enclosure	0.5%	0.3%	11.1%	10.2%
Indentation	0.9%	0.8%	12.4%	12.1%
Sub-numbering	1.1%	0.5%	13.1%	12.1%
Enclosure * Indentation	0.4%	0.9%	9.0%	8.5%
Enclosure * Sub-numbering	1.1%	0.5%	12.7%	9.9%
Indentation * Sub-numbering	1.0%	0.6%	15.0%	13.0%
Enclosure * Indentation * Sub-Numbering	0.5%	0.7%	8.5%	8.5%

Table Q.4: Percent of skip patterns where early and late responders had omission and commission errors on the follow-up questions for the UNL survey across all treatments

	Omission Errors		**Commission Errors**	
Visual Design Element	**Late**	**Early**	**Late**	**Early**
Control Form: No Added Elements	2.1%	1.6%	2.3%	2.0%
Enclosure	2.0%	1.2%	2.5%	1.6%
Indentation	3.9%	2.9%	3.6%	3.0%
Enclosure * Indentation	2.7%	2.1%	2.8%	1.2%

Q.2 Topic Salience: Interested and Not Interested Respondents

Table Q.5: Percent of skip patterns where interested and not interested respondents had item nonresponse errors on the filter question for the Labor survey across all treatments

Visual Design Element	Not Interested	Interested
Control Form: No Added Elements	4.3%	2.3%
Enclosure	4.9%	2.8%
Indentation	4.1%	3.9%
Sub-numbering	5.2%	4.4%
Enclosure * Indentation	4.5%	1.2%
Enclosure * Sub-numbering	5.8%	3.7%
Indentation * Sub-numbering	5.8%	3.0%
Enclosure * Indentation * Sub-Numbering	6.2%	2.2%

Table Q.6: Percent of skip patterns where interested and not interested respondents had item nonresponse errors on the filter question for the UNL survey across all treatments

Visual Design Element	Not Interested	Interested
Control Form: No Added Elements	2.7%	1.0%
Enclosure	1.0%	1.4%
Indentation	1.5%	1.1%
Enclosure * Indentation	0.3%	0.8%

Table Q.7: Percent of skip patterns where interested and not interested respondents had omission errors on the follow-up questions for the Labor survey across all treatments

Visual Design Element	**Not Interested**	**Interested**
Control Form: No Added Elements	0.5%	0.4%
Enclosure	0.3%	0.5%
Indentation	0.9%	0.9%
Sub-numbering	0.9%	0.3%
Enclosure * Indentation	0.9%	0.3%
Enclosure * Sub-numbering	0.9%	0.1%
Indentation * Sub-numbering	0.7%	0.8%
Enclosure * Indentation * Sub-Numbering	0.7%	0.5%

Table Q.8: Percent of skip patterns where interested and not interested respondents had commission errors on the follow-up questions for the Labor survey across all treatments

Visual Design Element	**Not Interested**	**Interested**
Control Form: No Added Elements	12.8%	9.9%
Enclosure	10.6%	9.8%
Indentation	12.6%	10.7%
Sub-numbering	11.4%	13.7%
Enclosure * Indentation	8.7%	7.0%
Enclosure * Sub-numbering	10.5%	10.6%
Indentation * Sub-numbering	14.3%	11.7%
Enclosure * Indentation * Sub-Numbering	8.1%	8.1%

Table Q.9: Percent of skip patterns where interested and not interested respondents had omission errors on the follow-up questions for the UNL survey across all treatments

Visual Design Element	**Not Interested**	**Interested**
Control Form: No Added Elements	1.9%	1.9%
Enclosure	1.7%	1.7%
Indentation	3.4%	3.5%
Enclosure * Indentation	1.9%	2.7%

Table Q.10: Percent of skip patterns where interested and not interested respondents had commission errors on the follow-up questions for the UNL survey across all treatments

Visual Design Element	**Not Interested**	**Interested**
Control Form: No Added Elements	2.4%	2.1%
Enclosure	3.2%	1.7%
Indentation	3.7%	3.1%
Enclosure * Indentation	2.1%	2.2%

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